



amateur radio

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JULY
1967

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25c

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4	500	45c	100	5	30c	100	25	45c
6	4	55c	100	50	80c	100	50	80c
5	12	25c	100	15	30c	100	250	85c
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10	6	25c	200	350	\$1.70	200	350	\$1.70
10	12	25c	230	6	36c	230	6	36c
10	25	30c	250	12	45c	250	12	45c
16	30	30c	250	50	50c	250	50	50c
16	350	45c	250	25	50c	250	50	85c
24	500	50c	250	50	65c	250	65c	65c
24	500	80c	500	12	65c	500	12	65c
25	25	30c	500	15	65c	500	15	65c
25	50	35c	500	50	\$1.15	500	50	\$1.15
30	6	25c	1000	15	85c	1000	15	85c
30	6	25c	1000	25	\$1.20	1000	25	\$1.20
32	350	65c	1000	50	\$1.25	1000	50	\$1.25
32	500	95c	2000	15	\$1.00	2000	15	\$1.00
50	15	30c	2000	25	\$1.35	2000	25	\$1.35
50	25	40c						
50	50	40c						

* P.V.C. can type

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John Batrick, VK3OR

FEDERAL COMMENT

☆

ON HOMEWORK

This evening, perhaps, while your children are doing their homework—before you chase those long-path Europeans on 20 metres, or chat to a couple of your friends on 2 metres, or finish wiring-up that project, or whatever you planned—may we suggest some homework for you?

In this issue appears the first of a series of Executive Communications designed to acquaint Australian Amateurs with certain important matters affecting the future of Amateur Radio. Please read George VK3VX's article on the I.T.U., then to do some homework!

Take a piece of paper, a pen; rule your paper down the page into three columns. Head the first column "for us", the second one "agin us", and the third "don't know". Look at the list of Member Countries of I.T.U., and place each in one of the columns, then add them up. What is your answer?

On what basis can one place countries in those three categories? Yes, it's a bit hard, even for h.f. operators; v.h.f. operators do this exercise, too—although you are not much concerned at operation outside Australia, the maintenance of your spectrum allocations within Australia depends on just the same thing: VOTES AT I.T.U. CONFERENCES CAST BY AMATEUR-ORIENTED COUNTRIES.

How does one tell if a country is "Amateur-oriented"? Some guideline: Is the Amateur prefix often heard? Is the operator of that station an indigenous person (not an ex-patriate American, Briton, etc., or a DX-peditioner)? Does his country have an active Amateur Society? Has his Society such a standing that he is a member of it? Is his Society on good terms with his country's administration?

Affirmative answers probably indicate that the country MAY be "Amateur-oriented", and it MAY cast its vote in favour of its Amateurs and their frequencies. My homework indicates that in the last resort we will need 66 countries who do! Unless there are no further I.T.U. Conferences. Then what?

—JOHN B. BATRICK, VK3OR, Federal Secretary.

CONTENTS

Conversion of Crystal Calibrator No. 10	3	Contest Calendar	4
"The Thing"—Transistorised, Part Three	5	Prediction Charts for July 1967	17
Transistor Amplifier Design, Part Four	9	New Call Signs	17
Sideband	13	Federal Contest Committee Regrets	17
What is the I.T.U.?	14	Overseas Contest Results	17
Book Review:		DX	19
Radio Amateur's Handbook	18	SWL	20
World Radio T.V. Handbook	18	Youth Radio Scheme	20
How to Build an Inexpensive Transistor Radio	18	VHF	21
10th Jamboree-on-the-Air	4	Correspondence	22
		Federal and Divisional Monthly News Reports	23



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Outp. Imped. ohms	40	15	15	15	3	8	600
Supply Volt.	9	9	9	9	12	9	9
Typical Distortion % ..	2	3	3	3	3	3	1
Frequency response	300-15K	200-12K	200-12K	200-12K	50-12K	50-12K	20-20K
Overall Dimensions	2x1	2½x1½	2½x1½	2½x1½	5½x1½	3x1½	2x1
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Type K5B20: Normal a.c. (r.m.s.) Circuit Voltage, 240 r.m.s., Current capacity 5 amps. \$3.45 plus S.T. 12½%

Pulse Diode, Type K2C .. 78c plus S.T. 12½%

Pulse Transformer \$1.20 plus S.T. 12½%

Please add Packing and Post, 10c set.

NOTE: A Circuit is available for making a 1,000 watt Light Dimmer using K5B20, K2C, Pulse Transformer and a few resistors and condensers. Write or call for a copy.

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25c plus S.T. 25%. Pack and Post 5c.

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CONVERSION OF CRYSTAL CALIBRATOR No. 10

• There are a number of these crystal calibrators on the market at a very low price, which make excellent wave meters. However, unmodified it is necessary to supply the unit's filaments with 12 volts d.c., which is difficult to obtain without lugging a car battery into the shack. Readers are given a choice of two methods of conversion for the filaments of the unit.

THE unit consists of a 500 Kc. crystal controlled oscillator, providing output in multiples of 500 Kc.; a v.f.o. with a tuning range of 250 Kc. and a mixer in which the signals are combined and the output taken.

Output is useable to 30 Mc. at 2 Kc. calibrated intervals.

The calibrator requires an external power pack of 12v. d.c. for the filaments and 250-300v. d.c. h.t. (More output is obtained when the h.t. supply is 300 volts.)

Valves used are 1T4 (crystal oscillator), 1R5 (mixer), 1T4 (v.f.o.) and a CV286 neon which discharges at one second intervals to identify the unmodulated carrier output.

Modifications to Permit D.C. Operation on 3v. in lieu of 12v.

ALAN R. HERALD,† VK3AJF

The simple modification described enables the filaments to be operated on 3 volts d.c. at 150 mA.

Remove the four screws at the extreme corners of the front of the unit and remove from the box. Lay on the bench face downwards with the dial glass nearest to you. A thick wire choke will be noticed attached to the left side of the switch. Connect approximately 2½" of wire from the solder lug at the left end of the choke to the solder lug on the top edge of the chassis to the left of the neon tube (CV286). (There is a r.f. choke connected from this solder lug to pin 7 of the neighbouring CV785 tube.)

Next lay the unit upright on its top edge. Behind the switch, between the two panels, in the right hand corner will be found a red 22 ohm resistor connected from the rheostat to an earth lug. Cut the resistor from the earth lug and leave the cut end clear of the chassis. It may be possible to completely remove the resistor from the rheostat, but it is difficult to get any tools into the small space. The unit will now operate on 3 volts d.c. filament supply and 250-300 volts d.c. h.t.

Connections on the input pins on the front panel are now as follows. The left hand "thicker" pin, 3 volts positive; centre pin, h.t. 250-300 volts d.c.; while the right hand "thin" pin is the common negative.

No doubt the connecting cable provided will be used to connect the battery and h.t. Do not be fooled by the colours of the wires in this cable; they are most unconventional.

As the power consumption at 3 volts is only 150 mA., a cycle lamp battery should be sufficient to supply the unit for a long time with the intermittent use a wave meter gets.

If the dial does not zero beat the crystal frequency at the high frequency end (left end), adjust the trimmer adjacent to the tuning condenser.

A full description of the technical details of the unit will be found in "A.R." December 1960.

Rewired for A.C. Valves

I. W. O'TOOLE,† VK2ZIO

As the author is not equipped to operate battery tubes, conversion to a.c. became a necessity and operation of the filaments from 12v. a.c. was tried, but proved to be unsatisfactory owing to a high hum and low output level. (The latter being apparently normal.)

As this step proved unsuitable, the unit was rewired for a.c. valves. Of the valves on hand, the first selection proved suitable. They were: 6AM6 (xtal osc.), 6AM6 (v.f.o.) and 6BE6 (mixer). The neon (CV286) remained unchanged.

Although the change to a.c. valves requires the complete rewiring of the sockets, no component values have to be changed, or additional ones added. The filaments now become 6v. operated, though 12v. operation is possible by placing a dropping resistor in series with one of the valve filaments, or replacing this with a pilot light of suitable current rating, installed above the dial plate.

When the power was applied a very considerable increase in output was evident, the results being well worth the time taken.

Expected operating voltages should be:—

Crystal Oscillator, 6AM6:
Plate 60v., Screen 60v.
V.f.o., 6AM6:
Plate 40v., Screen 15v.
Mixer, 6BE6:
Plate 30v., Screen 25v.

These voltages may appear to be rather low, the input h.t. being 230v., though any increase in h.t. applied to the tubes would result in increased temperature drift after switch on, which would be when it was required for measurement.

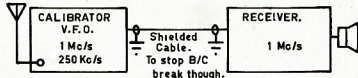
Effective h.t. on the plates and screens could be increased by altering the value of the feeder resistors, which are quite high, giving increased output if one was not concerned with drift.

VALVE BASE NUMBERS

Pin	1T4	6AM6	1R5	6BE6
1	F—	G1	F—	G1
2	P	K	P	K, G5
3	G2	H	G2, G4	H
4	NC	H	G1	H
5	F—	P	G5, F—	P
6	G1	G3, Is	G3	G2, G4
7	F+	G2	F+	G3

At this stage, the v.f.o. calibration accuracy was checked and found to be quite erroneous, brought about by the changed valve capacitance and component positions plus the fact that the

Aerial (finger) for 10Kc/s calibration.



Control switch on "DIAL".

Tune V.F.O. for zero beat.

CALIBRATING THE V.F.O.

The cathodes of the three a.c. valves were earthed, the crystal oscillator and mixer valves directly, and that of the v.f.o. through the v.f.o. coil (Z1/ZA 34863), the connection being made to the lug nearest to pin 7. All other wires were reconnected to the appropriate elements.

Rewiring may appear to be tedious work, but it did not exceed 45 minutes in the author's case, and he also managed to fit all of the components back in!

adjustments had not been adequately "anchored" when the unit was last calibrated.

Calibration appeared to be rather a headache and after much thought a foolproof method was evolved, whereby the v.f.o. could be calibrated against the crystal oscillator, using a receiver tuned to 1 Mc.

With the control knob turned to 500 Kc., the receiver is tuned to 1 Mc., a b.f.o. being used to zero beat the incoming signal. With the control knob on "dial" the v.f.o. is tuned to 1 Mc. (calibrated scale) and the Philips trim-

178 Garden Grove Parade, Adamstown Heights, Newcastle, N.S.W.

* 12 Elm Street, Surrey Hills, E.10, Vic.

mer on C26 (v.f.o. gang) is adjusted until the v.f.o. zero beats with the xtal oscillator output at 1 Mc.

The v.f.o. is then tuned to 250 Kc., the harmonic from this being used to zero beat with the crystal output on 1 Mc., the v.f.o. frequency being adjusted by the slug at the top of the v.f.o. coil (Z1/ZA34863).

These two operations are repeated until calibration at both ends of the dial is correct. When this has been achieved, the unit can be placed in use.

The addition of a shielded output socket and lead to the receiver (which is a necessity during normal operation) and the retaining of the original screw down aerial terminal, allows calibration of the 10 Kc. points.

Armed with a pencil and paper and the same test set-up as before (this time at night), tune the b.c. receiver and the calibrator v.f.o. to 750 Kc.

By placing one's finger on the original calibrator aerial terminal the broadcast station on that frequency (4QS Too-woomba) may be heard without any heterodyning whistle, when the calibrator is tuned correctly to 750 Kc. This procedure is then used every 10 Kc. until the v.f.o. is tuned to 1 Mc. While this is being done, a list of errors is prepared, and studied in preparation for frequency correction.

This error can then be reduced by moving the outer plate of the tuning capacitor. Gaps have been cut from the plate to allow this to be carried out, over sufficient portions of the range.

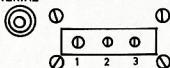
The author's v.f.o. appears to have a maximum error of +300 c.p.s., which is quite acceptable as errors are not multiplied, as the unit operates on an additive basis.

Other valves could be used in place of the ones listed, particularly in the case of the 6AM6, 6BA6s or 6AU6s should operate in this place satisfactorily.

If the existing power socket, plug and cable are to be used, one should note

that the wire colours in the cable are not connected with the conventional colour code in view.

AERIAL



POWER INPUT PLUG.

		Old	New
Pin 1	F+	12v. d.c.	6v. a.c.
Pin 2	HT+	250v.	250v.
Pin 3	Earth	—	—

OPERATION

The calibrator is not to be confused with a signal generator, the latter being designed to produce output on only one frequency (plus harmonics). The calibrator produces output at every 500 Kc. and when the v.f.o. is on, at four additional points per megacycle.

This means that the calibrator will produce 180 calibration points between 0-30 Mc. at any one time. Hence any receiver being used in conjunction with the calibrator must have reasonable calibration if quick readings are desired.

To find any given frequency turn on the receiver b.f.o., tune to obtain zero beat with the v.f.o. signal. When measuring the frequency of a received signal, heterodyne the v.f.o. against the signal, refer to the receiver dial, then read the v.f.o. dial.

If the unit is in continual use, a plug in the case may be screwed out to offset temperature drift.

Once the calibration has been corrected, drift has not been noticed. The unit has been in a car travelling over gravel roads of the worst order and the calibration has remained correct.

The author has tried numerous circuits and methods to obtain accurate frequency readings, this unit being so far the best, and a delight to operate, even WWV is now on frequency!!

CALIBRATION CHART

Frequency Kc.	10 Kc. Correction	Deviation C/s.
		+ —
750	0
760	200
770	300
to	etc.
1000	etc.

10th JAMBOREE-ON-THE-AIR

This year's Jamboree-on-the-Air has been scheduled for the period 0001 hours G.M.T. on Saturday, 5th August, to 2359 hours G.M.T. Sunday, 6th August.

This coincides with the holding of the XII. World Jamboree in Idaho, U.S.A., and also with the 60th Anniversary of the first experimental radio camp on Brownsea Island, England, in 1917.

In celebration of Scouting's Diamond Jubilee, Scouts throughout the world are planning a "link" camp, and it is hoped that most, if not all, of them will be equipped for the week-end of 5th/6th August with an Amateur Radio station "linking" them with stations at both the World Jamboree and on Brownsea Island. In some countries, school holidays do not fall in August. Scouts in these countries can take part in the J.O.T.A. in the usual manner—by visiting a friendly Amateur Radio operator. With very few exceptions, every member of the Movement will be able to share in the celebrations—whether as a participant in the World Jamboree, or in a "link" camp, or from his home town. Short wave listeners are, of course, very welcome participants and many of our most useful reports in the past have come from these sources.

The World Bureau station VE3WSB will NOT operate during this J.O.T.A., since most of its staff will be working the World Jamboree. Instead, its place will be taken by KTWSJ (King Seven World Scout Jamboree) operating from 8 a.m. to 10 p.m. at Farragut State Park in Idaho, U.S.A. This station will operate part-time from 1st to 9th August except for the period of the 10th Jamboree-on-the-Air, when it will be in continuous operation for the full 48 hours of the event, using three complete stations and the following frequencies according to prevailing conditions:

Band	C.W.	S.S.B.
80 Metres	3,525 Kc.	3,950 Kc.*
40 Metres	7,025 Kc.	7,280 Kc.*
30 Metres	14,025 Kc.	14,380 Kc.*
15 Metres	21,025 Kc.	21,290 Kc.*
10 Metres	28,025 Kc.	28,580 Kc.*

Note that the higher frequency in each band is of necessity in the U.S.A. segment, in order to comply with local licence regulations. Note also that frequencies indicated by an asterisk are outside the approved Australian frequencies and Groups should not make an attempt to use these two particular frequencies.

A special station will operate from Brownsea Island, using the call G3BSB. The originator of the J.O.T.A., Les Mitchell, will be in charge of this station. No information as to the frequencies to be used are available as yet, but this information will be passed on as soon as it comes to hand.

Both the above stations will issue special QSL cards to all stations they contact.

CONTEST CALENDAR

July 8/9: N.Z.A.R.T. Memorial Contest (3.5 Mc. only).
 July 8/9: R.S.G.B. 1.5 Mc. "Summer" Contest.
 August 12/13: Remembrance Day Contest.
 August 12/13: 13th W.A.E. DX Contest (c.w. section).
 September 9/10: 13th W.A.E. DX Contest (phone section).
 October 7/8: VK-ZL-Oceania DX Contest (phone section).
 October 14/15: VK-ZL-Oceania DX Contest (c.w. section).
 October 14/15: R.S.G.B. 21/28 Mc. Telephony Contest.
 October 28/29: R.S.G.B. 7 Mc. DX Contest (phone section).
 November 11/12: R.S.G.B. 7 Mc. DX Contest (c.w. section).

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PART THREE

RUBBER CRYSTALS

The decision to change the frequency of my previous crystals was made with some slight trepidation. However, having literally decided to cross the "Rubicon," I was pleased for doing so. The results were good and the experience gained was invaluable.

Literature consulted revealed two approved methods. One being plating, which lowers the frequency, whilst an increase in frequency results from edge grinding. Both methods were tried at VK2PY and I am able to report that reasonable success was achieved with both methods.

Plating Method

The plating method will be described first, the bath for which is made up as follows:—

Copper sulphate: 30 gms.

Sulphuric acid: 10 c.c. (warning, see note).

Alcohol: 10 c.c.

Water: 200 c.c.

Both the copper sulphate and acid are obtainable from the local chemist. **Warning:** The mixing of concentrated acid and water is dangerous. It is, therefore, advisable to have the chemist do this for you. Naturally the amount of water added to the concentrated acid should be subtracted from the total requirement. The alcohol (not drinking type, although a swig or two would have been helpful) used was ordinary metho. Gently heat the water and add the sulphate, stir well and when the crystals have dissolved pour the solution into a glass tumbler. Obtain a length of heavy gauge copper wire, for use as an anode, and instal in tumbler as shown in Fig. 9.

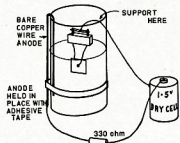


FIG. 9

Some initial practice on less valuable objects is recommended as a starter. I used a sixpence because the crystals were silver plated. For your first experiment, substitute a 22 ohm resistor in place of the 330 ohm. Lower the "zac" into the solution as shown in Fig. 9 and add about half of the specified amount of acid and metho. Grad-

ually add lesser amounts until the plating becomes smooth and copper coloured.

Five minutes' plating will have the sixpence looking like two cents. As plating is reversible, interchange the battery connections and "hey presto" some minutes later the sixpence will be restored to its original condition. A slight amount of rubbing with the fingers will remove any residual deposit of discolouration.

Replace the 330 ohm resistor and give the same treatment to another "zac". This is where things seemed to go haywire. Half an hour's plating resulted in a deposit so light as to be practically non-existent. Closer inspection revealed a fine even coating so thin that the silver colour of the coin shone through. This had me worried, however it was soon learnt that this is the ideal condition. Any attempt to deposit copper at a faster rate results in control of the process being lost.

Before commencing operations on your crystals, make sure that they are active and measure their frequency of oscillation, as a reference will be needed to gauge the progress of frequency shift.

We are now ready for the "Rubicon". Carefully remove the two small screws in the bottom of the crystal holder and then gently remove the top cover. Next wrap some light wire around both pins and lower into plating bath. Try to keep as much of the holder as possible out of the solution as this makes for easier cleaning.

After about five minutes remove the crystal from the bath. Dunk it into warm water, then into metho, back into another container of water, agitating it for several minutes and then into another container of metho or spirits. When completely dry compare the frequency against the original reference. You will now have a guide as to time required for a given frequency change.

At VK2PY 10 minutes was required to change a channel 25 crystal from 416.66 Kc. down to 415.550 Kc. It was soon discovered that 2 Kc. was about the maximum change obtainable without reducing the Q of the crystal to a point where it becomes useless. If this happens, don't worry, the crystals are recovered by reverse plating. Of course the same treatment is given when the required frequency has been considerably overshoot. Where the overshoot is only small, it was found better to bring the frequency back by edge grinding. This will be described in detail a little later in this article. It must also be pointed out that crystals can be raised from their original frequency by reverse plating, however this was not tried as it was considered to be too touchy. If too much metal is removed from the crystal you are finished with it forever (unless you have a museum). As this represents a pos-

sible loss of hard-earned "hoot", it was considered wise to avoid this method altogether.

Before proceeding on to the grinding method, I must emphasise that care, extreme cleanliness, and patience must be observed throughout the whole process. It is better to spend time rather than end up with a heap of useless quartz crystal.

Edge Grinding

Having mastered the plating method, you are now ready to be initiated into the mysteries of edge grinding. Shifts of 10 Kc. and over are easily obtainable and in my opinion this method is far superior to plating.

The requirements are a small piece of wet and dry (about 240 grade) rubbing paper, a pair of tweezers, a steady hand, and a strong wrist. The method here is as follows:

Remove the two small screws in the base of the holder and carefully remove the top cover and, of course, you have measured and noted the frequency. Pardon this harping on the necessity of keeping a reference point.

With your tweezers in the left hand firmly hold the crystal whilst supporting the wrist by placing it on your work bench. The crystal holder should be steadied by resting it on a support, as shown in Fig. 10. Hold the wet and dry paper (do not wet) in your right hand and give the crystal 20 or 30 sharp rubs along the top edge as shown.

It would be wise to re-measure the frequency of the crystal in order to gain some clue as to how many rubs will be required to shift the crystal to the correct frequency. Shifts of over 1 Kc. are easier to obtain by operating on two adjacent edges. "Gently, Bentley," is the order of the day here. Once the wires that are soldered to the crystal come adrift your interest in that crystal is suddenly terminated.

I suffered from what at first sight appeared to be an irrecoverable casualty. Whilst striving for a large frequency change, I guess I was a trifle heavy handed with a channel 24 crystal and managed to chip off about 1/16" square from one corner. Before consigning it to the nearest w.p.b., some curiosity caused me to plug the wreck into my test oscillator. Wonder of wonders, it still oscillated and with tons of activity. In fact I had a brand new channel 30 crystal. This should give the reader some idea of how much change can be obtained by edge grinding. So much for grinding, remember any overshoot in frequency can be corrected by a few minutes in the plating bath.

The relative merits of the two methods are set out in Table 1.

Well chaps that's about it as far as crystal changes are concerned. Perhaps at some future date I might try my hand at high frequency crystal filters.

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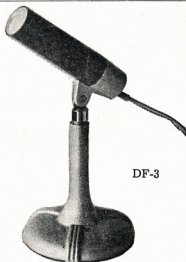
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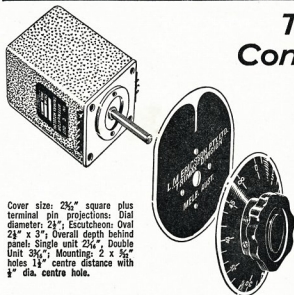
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LM50

TRANSISTOR AMPLIFIER DESIGN

R. L. HARRISON,* VK3ZRY

PART FOUR

CLASS B AMPLIFIERS

A class B amplifier is biased so that it conducts for only 180° of a sine-wave input cycle, as previously defined. That is, for an upward signal fluctuation, the transistor turns ON, while for downward signal fluctuations it remains OFF.

Thus, if we wish to amplify a full sine-wave, using a class B amplifier, we must have two devices in a symmetrical arrangement being driven 180° out of phase. That is, one device ON while the other is OFF. The most popular arrangement is push-pull using centre-tapped transformers (see Fig. 1).

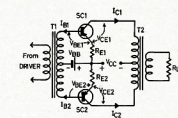


FIG. 1

The advantages of class B amplifiers are as follows:—

1. Theoretical maximum efficiency is 78% versus 50% for class A. Practical efficiencies approach 75%.
2. Quiescent power consumption is very low, whereas class A stages constantly draw power.
3. Even-harmonic distortion can be reduced to a minimum.
4. Two transistors share the power dissipation.
5. No net d.c. current flows through the output transformer, thus magnetising flux is zero, keeping the transformer weight low.

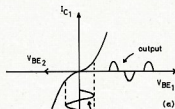
CROSSOVER DISTORTION

Transistor base characteristics are far from ideal, and if operated at cut-off, will produce a severe form of distortion called "crossover distortion". For small input signals this is particularly bad, the effect gradually decreasing as the signal increases (see Fig. 2a).

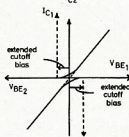
To overcome this, the transistors are given a slight forward bias (Fig. 2b). The transistors are biased to what is called "extended cut-off" (really class AB operation). For germanium transistors this value of extended cut-off bias is around 0.15 to 0.2 v. For silicon transistors this is 0.55 to 0.7 volt.

DESIGN PROCEDURE

Before attempting to design your class B amplifier, you should obtain the collector and base characteristics of several suitable transistors. Keep in mind the power output limitations as



(a)



(b)

FIG. 2.

set out in Part Three. You will find the design procedure very similar to Part Three.

1. Choose the power output desired and add 20% to account for losses.

$$\text{i.e. } P_o =$$

$$\text{Power desired} + \frac{1}{5} \text{ power desired} \dots (1)$$

2. Calculate P_o max. from the following equation:—

$$P_o \text{ max.} = \frac{1}{2} P_o \dots (2)$$

3. Choose V_{cc} . Check to see that V_{cc} is less than V_{ce} max. for any of the transistors. Discard any transistors that have V_{ce} max. less than V_{cc} .

4. Choosing your transistor: Select one that has a P_o max. somewhat greater than the value found in equation (2).

5. Calculate the collector to collector load resistance R_{cc} .

$$R_{cc} = \frac{2 V_{cc}}{P_o} \dots (3)$$

Check that I_c peak ($= 4 V_{cc} \div R_{cc}$) is less than the maximum allowable collector current for the value of V_{cc} used. If I_c peak exceeds max. allowable I_c then choose another transistor and check again. If this does not work out, increase R_{cc} .

6. Determine R_E for each transistor from the appropriate graph. Graphs 1 and 2 are for germanium transistors and Graphs 3 and 4 are for silicon transistors.

If the graphs do not go up to the value of R_{cc} you calculated, then use the following equations:—

For germanium transistor:

$$R_E = \frac{5 V_{BE}}{4 V_{cc}} \dots (4)$$

For silicon transistors:

$$R_E = \frac{V_{BE}}{2 V_{cc}} \dots (5)$$

where V_{BE} is the value of extended cut-off bias. For germanium transistors you can assume $V_{BE} = 0.15$ volts, and for silicon transistors you can assume $V_{BE} = 0.6$ volt.

Where R_E becomes very small, less than 2 ohms say, a rather neat little trick can be employed. Use a small length of toaster element (an inch or two), as the emitter resistor. As the average power increases, so does the junction temperature. The current through R_E increases as I_c increases, the length of toaster element increases its temperature, this increases its resistance. Thus providing some compensation for changes in forward conductance in the emitter-base junction due to temperature rise.

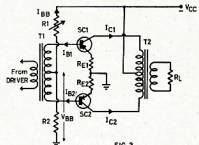


FIG. 3

7. Determine R_1 and R_2 (Fig. 3).

(a) First determine I_B for small signals. Go to the collector characteristics graph (I_c versus V_{ce}) and find the value (I_B) for one of the lowest curves (see Fig. 4). Now let $I_{B1} = 10 I_B$ (small signals).

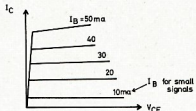


FIG. 4.

- (b) Now

$$R_1 = (V_{cc} - V_{BE}) \div I_{B1} \dots (6)$$

and

$$R_2 = (V_{BE} R_1) \div (V_{cc} - V_{BE}) \dots (7)$$

where V_{BE} is somewhat greater than the extended cut-off bias to overcome the voltage drop due to the resistance of the secondary winding of T_1 .

It would be a good move to make R_1 a wire-wound pot. of appropriate value and wattage to enable some adjustment to be made.

This method of bias gives no thermal stability of the bias past about 30°C. Where it is likely that a wide variation

* 1 Mary Street, North Balwyn, E.S. Vic.

in temperature will be encountered, then some compensation for changes in V_{BE} will have to be included. This will be described later.

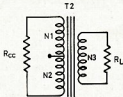


FIG. 5.

8. Now for the output transformer T2. Let's take a look at the equivalent circuit (Fig. 5).

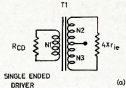
The load on the secondary (R_L) could be a speaker or the modulation impedance of a transmitter. The impedance across the primary is R_{cc} as found from equation (3).

Now—

$$(N_1 + N_2) \div N_3 = \sqrt{R_{cc} \div R_L} \quad \dots \dots \dots (8)$$

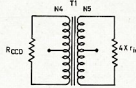
where $(N_1 + N_2)$ is the total primary turns, and N_3 the total secondary turns. It is recommended that the primary be bifilar wound to preserve balance and reduce transient responses.

9. The input or driver transformer (T1) comes next. Now we could have either a single-ended driver or a push-pull driver, see Figs. 6a and 6b respectively. The loads on primary and secondary are shown also.



SINGLE ENDED DRIVER

(a)



PUSH PULL DRIVER

(b)

FIG. 6

First determine r_{ie} —

(a)—

$$I_{B \text{ peak}} = I_C \text{ peak} \div h_{FE \text{ min.}} \quad \dots \dots \dots (9)$$

where $I_C \text{ peak} = 4 V_{CC} \div R_{cc}$ (see Fig. 7) and $h_{FE \text{ min.}}$ obtain from transistor data.

(b) Now go to the base characteristic curves (I_B versus V_{BE}) (Fig. 8) and find $V_{BE \text{ peak}}$.

(c) Now—

$$r_{ie} = (V_{BE \text{ peak}} - V_{BE}) \div I_{B \text{ peak}} \quad \dots \dots \dots (10)$$
 where V_{BE} = extended cut-off bias.

Next we have to calculate the power required to drive the amplifier (P_i) to full output. This is given by:—

$$P_i = \frac{I_C \text{ peak} \times V_{BE \text{ peak}} \times 1.5}{h_{FE \text{ min.}}} \quad \dots \dots \dots (11)$$

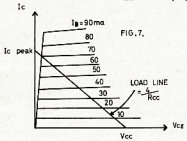


FIG. 7.

Now you can drive the amplifier in several different ways. This will necessitate a different primary load, and thus different turns ratio on T1. I will give equations for the following three methods: class A single-ended, class A push-pull, and class B push-pull.

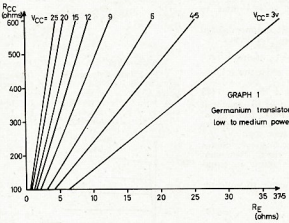
Here are the formulae for the primary loads. They will enable you to design a suitable driver.

For class A single-ended driver:

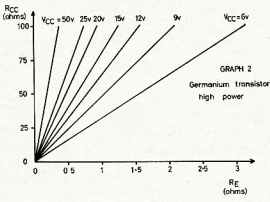
$$R_{cc} = V_{CC}^2 \div P_i \quad \dots \dots \dots (12)$$
 For class A push-pull driver:

$$R_{cc} = 2 V_{CC}^2 \div P_i \quad \dots \dots \dots (13)$$
 For class B push-pull driver:

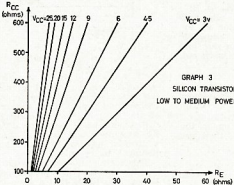
$$R_{cc} = 2 V_{CC}^2 \div P_i \quad \dots \dots \dots (14)$$



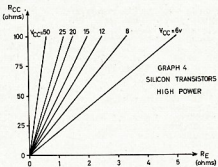
GRAPH 1
Germanium transistor
low to medium power



GRAPH 2
Germanium transistor
high power



GRAPH 3
SILICON TRANSISTORS
LOW TO MEDIUM POWER



GRAPH 4
SILICON TRANSISTORS
HIGH POWER

Now for the turns ratios for T1.

(a) Single-ended class A driver:

$$N1 \div (N2 + N3) = \sqrt{R_{CCB} \div 4 I_{B1}} \quad (15)$$

where N1 is primary turns and (N2 + N3) is total secondary turns.

(b) Push-pull class A driver:

$$N4 + N5 = \sqrt{R_{CCB} \text{ (class A)} \div 4 I_{B1}} \quad (16)$$

* R_{CCB} from equation (13).

(c) Push-pull class B driver:

$$N4 + N5 = \sqrt{R_{CCB} \text{ (class B)} \div 4 I_{B1}} \quad (17)$$

* R_{CCB} from equation (14).

where N4 is total primary turns (centre tapped) and N5 is total secondary turns (centre tapped).

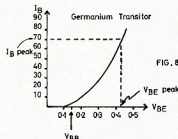


FIG. 8.

Now there you have your method for designing class B amplifiers. A short summary on the quantities you have to find will help clarify the situation.

- (1) P_o = power desired + $\frac{1}{2}$ power desired.
- (2) P_o max. = $\frac{1}{2} P_o$.
- (3) V_{CC} . Check $V_{CC} < V_{CE}$ max.
- (4) Transistor.
- (5) $R_{CC} = 2 V_{CC}^2 \div P_o$. Check $I_{C \text{ peak}} < I_{C \text{ allowable}}$.
- (6) R_L from graphs.
- (7) $R1 = (V_{CC} - V_{BB}) \div I_{B1}$.
 $R2 = V_{BB} R1 \div (V_{CC} - V_{BB})$.
- (8) T2. $(N1 + N2) \div N3 = \sqrt{R_{CC} \div R_L}$.
- (9) T1. Consider your driver, then use appropriate equations.

BIAS STABILITY CONSIDERATIONS

As you well know, V_{BB} will vary with temperature. This change is in the order of 1 to 2 mV/°C. Now this can produce quite a shift in the bias if a wide temperature range is encountered. Where high power transistors are used, the junction temperature will rise due to power dissipation. Also the ambient temperature may rise substantially—for example, in a car

standing in the sun, the internal temperature in certain places may be 15 to 20°C. higher than the external temperature.

Now, all increases in temperature will increase V_{BB} , gradually increasing I_C , which increases the junction temperature and so on until the transistor "runs away" and destroys itself. This is a highly undesirable state of affairs.

There are several ways to prevent thermal run away. One is to limit the temperature rise of the transistor by mounting in on a heat sink (more about that later). Another way is to compensate for the changes in V_{BB} . This is very suitably done by using a suitable diode to control V_{BB} (see Fig. 9).

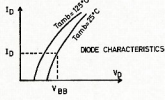


FIG. 10(a).

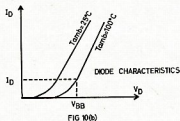


FIG. 10(b).

Now D1 can be chosen so that it changes its forward voltage drop at the same rate as the emitter-base diodes of the transistors. R1 is adjusted to give the correct bias to the transistors to prevent crossover distortion. The purpose of D2 is to provide a low impedance return for the base drive circuit. D2 has no effect on bias stability.

To find a suitable diode for D1, look for one that has an $I_{B \text{ max}}$ greater than $I_{B \text{ peak}}$. If you are using germanium transistors, look for a germanium diode. For silicon transistors use a silicon diode.

Having chosen your diode, the next thing you wish to know is $I_{B \text{ peak}}$. Determine this from the diode characteristics

(I_B versus V_{BB}) (see Figs. 10a or 10b—diode characteristic curves can be shown either way). Use the curve for the lowest ambient temperature (T_{amb}) shown (usually $T_{amb} = 25^\circ\text{C}$). Locate V_{BB} on the V_D axis. Now V_{BB} should be slightly higher than the extended cut-off bias (V_{BB}) to account for losses in T1. A good rule of thumb is:—

Germanium, $V_{BB} = 0.2$ to 0.25 volt
Silicon, $V_{BB} = 0.7$ to 0.8 volt.

Now find I_{B1} as in Fig. 10, then calculate R1 from the following formula:—

$$R1 = \frac{(V_{CC} - V_{BB})}{2 \times I_{B1} \text{ (small signals)} + I_{B1}} \quad (18)$$

I suggest you make R1 a pot, to allow for adjustments that may be necessary, as the driver transformer secondary resistances are unknown. D1 and D2 can both be of the same type.

This system can be used to provide compensation for bias changes, due to temperature change, in class A amplifiers (refer to Part Three). You will find that V_{BB} is higher than that for class B amplifiers, so just connect sufficient diodes in series to make up the voltage drop for V_{BB} . Choosing the diodes is the same as for class B. Also, when calculating R1, $V_{BB} = V_{BB} + V_{BB}$ (refer to Part Three).

A circuit is given in Figs. 12a and 12b. All diodes are of the same type. Make sure the diodes are connected in the right polarity for the transistors in use (i.e. Fig. 12 shows NPN transistors; reverse the diodes for PNP transistors).

HEAT SINKS

Any transistor is capable of supplying a substantial amount more power when it is mounted on a heat sink of adequate proportions. The efficiency of a heat sink is determined by its thermal resistance. The thermal resistance is affected by the surface, material, colour, if the air flow around it is restricted or free, and thermal contact to other heat conductors, of the heat sink. Thus, heat sinks are often painted black (good thermal radiator), have fins (to increase surface area) and are mounted in easily accessible places or on metal chassis.

High power transistors are made in a case that facilitates attachment to a heat sink. Usually the case has the collector internally connected to it, and where the collector has to be insulated

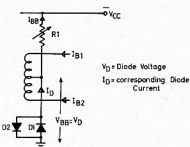


FIG. 9.

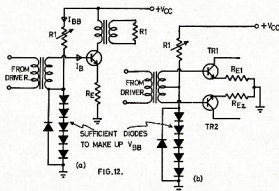


FIG. 12.

from earth, a mica washer can be obtained (as well as bolt hole insulators). Alternatively, the heat sink can be insulated from earth, but this is not always practicable as the chassis is often used as a heat sink.

Extruded aluminium heat sinks, meant for power transistors, are obtainable in various sizes, e.g. 2 x 4, 4 x 4, and 6 x 4 inches. Most are made to mount a single transistor, but some are made to mount two transistors. The heat sink you choose should be as large as you can afford, keeping in mind the power involved.

Small, low power transistors have a body that can be clamped onto a chassis or a metal fin. The manufacturers often recommend a suitable size and shape of the metal fin type of heat sink. You

can either buy one or make one (see Fig. 11a).

Other ingenious ideas can be used to make heat sinks. A small length of copper tubing, with an inside diameter just too small to fit over the body of the transistor, can be cut down in length and sprung apart so that it makes a tight fit over the transistor (see Fig. 11b).

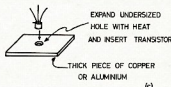
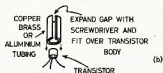
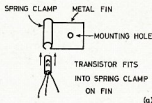


FIG. 11

A hole, just smaller than the transistor body, could be drilled in a thick piece of aluminium, brass or copper, the metal heated and the transistor dropped into the expanded hole (Fig. 11c). When the metal cools and contracts the transistor is firmly held, making good thermal contact with the transistor and heat sinking is very effective. You may experience trouble if you attempt to remove the transistor however.

Where practicable, the diode (or diodes) in the bias circuit (if used) should be mounted on the heat sink near the transistor so that it is subject to the same temperature changes as the transistor. Insulate the diode with mica (very thin) if necessary.

Well, that concludes this article on transistor amplifier design. The next article (Part Five) will be on class B and class C r.f. transistor amplifiers. There will be a follow up article (Part Six) on practical, working circuits, that have been constructed from this series of articles.

This series has been longer than I intended, but that was of necessity so that a complete amplifier stage could be designed and constructed with adequate safety precautions.

I would, at this stage, like to thank a number of my friends who gave me abundant encouragement and criticism as well as help during the writing of

these articles. Thanks to Peter Cohn (VK3ZPC), Dennis Long (VK3ZVL), John Hill, Graham Young, Steve Tomlinson and Mary.

Any queries should be addressed to me and please enclose a s.a.e.

REFERENCES

- "Transistor Circuit Design," Texas Instruments.
- "Principles of Transistor Circuits," R. F. Shea.
- "Transistor A.F. Amplifiers," Jones & Hillbourne.
- "Transistor Physics & Circuits," Riddle and Rittenbatt.
- "Electronic Fundamentals & Applications," John D. Ryder.
- "Transistor Manual," G.E. Company.
- "Transistors & Diodes," Phillips.
- "73 Magazine".
- "A.R." Nov. 1965.
- "Transistors," Milton S. Kiver.
- "Reference Manual of Transistor Circuits," Mullard.

ARE YOU FAMILIAR WITH "73"?

"73 Magazine" was founded in 1960 in an effort to provide the Amateur with up to date reading material on the state of electronics. As most of you know, most of the Amateur journals are full of operating news, DX columns, and "who did what to whom." On the other hand, "73 Magazine" is devoted to the credo that Hams like to build, like to experiment and are interested in trying out new circuits. If you look through the last five years of "73," you will find over 2,000 technical articles. Right now "73" averages 35 technical articles per month; more than most of the other Amateur magazines put together.

It doesn't matter whether your primary interest is in SSB, RTTY, VHF, microwave, valve, transistor or integrated circuit, every single month the staff at "73" tries to have something for you. In addition, many electronic developments were first introduced to the Ham fraternity from the pages of "73," including field effect transistors, UHF transistors and integrated circuits.

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SIDEBAND

Sub-Editor: PHIL WILLIAMS, VK5NN

As these notes are being written while on vacation in VK3 (of all places) the subject matter cannot be very technical and I ask the more fastidious readers to refrain from taking me to task over details which cannot be checked in the absence of my technical library, for which there was just no room in the caravan.

There are several items which come to mind and may interest home constructors, one dealing with variable frequency oscillators and the other concerning a rather unusual but quite logical design for an s.s.b. exciter.

Before getting under way with these, however, may I thank the many correspondents who have written to me on all sorts of sideband matters from exciters to transistors, and pardon myself for not replying for the reason stated above. Many people accuse me of being so pro-sideband that I must be anti-other-modes. This is not strictly true, as I have some a.m. equipment for 6 and 2 metres, myself, but I would say to those who are obviously anti-sideband that they, too, may learn something from this column, as linear amplifiers will do quite a good job of amplifying a.m., even though the efficiency may be low. Taxi-phones and 122 sets, for example, may be fed into linear amplifiers and the equivalent of 75 watt a.m. rig can be obtained at less cost and space than using high-level plate modulation.

Having listened to thousands of a.m. signals throughout the years, I may truthfully state that the number of well adjusted class C plate-modulated p.a. stages in the Amateur bands is quite small. It is a very difficult task to make sure that such a stage has the correct grid current, grid voltage, screen voltage, plate voltage, modulator output impedance, load impedance (r.f.), neutralisation, and tuning, all together at the same time. I am not saying that it is impossible, but it is difficult.

The class B linear amplifier, especially the ABI type which draws no grid current, is much easier to adjust because there are many less variables to consider. It does not take a genius to realise this, one needs only the normal complement of fingers to count with.

In conclusion, my own 2 metre final (a.m.) appears to be almost impossible to neutralise, and I know it, but not one person apart from myself worries about a little "broadness" on 2 metres.

BUILT-IN V.F.O.'S AND HEAT

This small hint has proved useful in many Amateur stations, not only in s.s.b. equipment. Every receiver has a v.f.o. and some of the cheap ones are plagued with heat drift. Substi-

tution of silicon rectifiers for the h.t. valve rectifier, reduces the heat liberated inside the box and addition of a VR tube in the (rewired) rectifier socket, really helps the frequency stability.

There is still the problem of heat radiation and conduction, however, and I have found that drilling a row of holes in the chassis, either around a heat source such as the audio output tube socket, or around the r.f. coil box, will reduce the heat conduction. Holes should be spaced to leave about one-third of the hole diameter between each hole to retain sufficient rigidity in the metal.

The radiation and convection of heat may be reduced by fixing half inch thick foam polystyrene, you know the stuff—it looks and feels like solid froth, and is an excellent heat insulator and reflector—to the outside of the v.f.o. box or between hot objects and the tuning components. This is really good gen, and the improvement in my delta-tuned oscillator, when a sheet of this was cut to form a 6" x 4" tiered barrier, was quite marked. The receiver appears to stabilise in about 7 or 8 minutes instead of about 15 to 20 minutes previously. Do not attempt to glue this foam with polystyrene cement as the solvent has a sad effect on the foam and it melts away like "fairy floss". Water based cements, such as the "gums" and p.v.a. wood-worker's glue, are quite good, or the assembly may be fixed to the desired shape with white adhesive tape (fabric type—from the chemist). If you wish to change its colour, then cover the whole assembly with aluminium (cooking) foil, and spray paint over that—not onto the

foam, or you will have further solvent troubles.

And where does one obtain this foam? Well, you will see it formed into all sorts of packing pieces for fragile and expensive items from chinaware to electronic instruments—even meat trays in the super-markets—or the larger builders' hardware merchants sell sheets up to 6 x 3 ft. for special insulation jobs.

A STRAIGHT S.S.B. EXCITER

Most s.s.b. exciters are far from straight as they mix frequencies up and down, and then have to get rid of all the spurious beats to the point of keeping them more than 60 db. down below the required signal.

An interesting exciter designed by G3HRO was described in "Wireless World" for March and April 1967. This exciter is quite unusual as the v.f.o. tunes at half of the final frequency for 40 and 80 metres, and a third of the final frequency for 20, 15 and 10 metres. The balanced modulators are fed with final frequency at plus and minus 45 degrees from five different r.f. phase shift networks, one for each band. The two balanced modulators are type 7360 valves, which are quite superior for balancing out carriers, and employ the phasing method of generation of s.s.b. This part of the circuit is almost identical with the circuit in the 1965 A.R.R.L. Handbook, from which it was no doubt taken.

Since the output from this generator is reasonably high, the signal feeds straight into a 5763 driver and thence to a 4CX250B final stage, which can operate at the full legal rating for U.K. of 400 watts p.p.s. A very neat little transistorised vox circuit is included.

Of course, a separate h.v. power supply of over 1,500 volts is needed for the 4CX250B, and a blower is required to cool it, but if you do not want to run such high power, 6146s or the t.v. line tubes may be installed with similar grid bias and screen grid supplies, but plate voltage of 700-800 volts only, should be applied to these smaller tubes.

(Continued on Page 22)

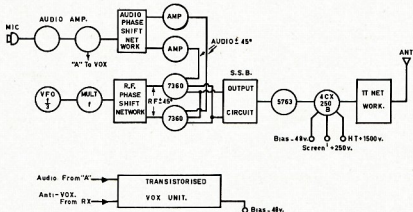


FIG. 1. S.S.B. EXCITER BLOCK DIAGRAM.

Fully described in "Wireless World," March and April, 1967.

WHAT IS THE I.T.U.?

G. PITHER, VK3VX, W.I.A. Federal Liaison Officer



G. Pither, VK3VX

It is the International Telecommunications Union and it has grown from an organisation founded in 1865 to establish telegraph regulations. It is the world body established to maintain order in the Radio Frequency Spectrum. As such, it sets the limits of the frequencies used by Radio Amateurs, and it has in its hands the very existence of Amateur Radio.

HISTORY

For more than 100 years an international body has existed to establish international agreements covering radio communications, and an outline of its history is given here:—

- 1837—First electric telegraph.
- 1849—The telegraph first used internationally.
- 1865—Paris, 17th May. Foundation of the **International Telegraph Union** by twenty States with the adoption of the first Convention. First Telegraph Regulations.
- 1868—Vienna Conference. Bureau of the Union set up in Berne.
- 1871-2—Rome Conference.
- 1875—Saint Petersburg Conference. New Convention which lasted until 1932.
- 1876—Invention of the telephone by Alexander Graham Bell.
- 1885—Berlin. Administrative Conference makes first I.T.U. provisions for international telephony.
- 1895-6—First wireless transmissions.
- 1903—Berlin. Preliminary Radio Conference of nine States.
- 1906—Berlin. First International Radio Conference with 29 States. Convention and Radio Regulations drawn up. Adoption of SOS signal.
- 1912—Titanic disaster. London Radio Conference. Improved Radio Regulations.
- 1924—Paris. Creation of C.C.I.F. (International Telephone Consultative Committee).
- 1925—Paris. Creation of C.C.I.T. (International Telegraph Consultative Committee).
- 1927—Washington Radio Conference with 80 States. Establishment of C.C.I.R. (International Radio Consultative Committee). **First allocation of radio frequencies to the various radio services.**
- 1932—Madrid Conferences. Organisation's title changed to International Telecommunication Union. First single International Telecommunication Convention. New Radio, Telegraph and Telephone Regulations.
- 1938—Cairo Administrative Radio and Telegraph and Telephone Conferences.

- 1947—Atlantic City. Plenipotentiary and Radio Conferences. Creation of International Frequency Registration Board (F.R.B.). New International Frequency List. Creation of the Administrative Council. Agreement with the United Nations approved.
- 1948—Seat of the Union transferred to Geneva.
- 1952—Buenos Aires Plenipotentiary Conference.
- 1956—Geneva. C.C.I.F. and C.C.I.T. merged into new C.C.I.T.T. (International Telegraph and Telephone Consultative Committee).
- 1958—Geneva Telegraph and Telephone Conference.
- 1959—Geneva Plenipotentiary and Radio Conference.
- 1962—New headquarters building opened in Geneva.
- 1963—Geneva Plenipotentiary, Radio, and Space Conferences.
- 1966—C.C.I.R. Plenary Conference.

THE WORKINGS OF THE I.T.U.

A brief outline of the organisation and functions of the Union will serve to establish an understanding of its operations. See organisation chart on opposite page.

AUSTRALIAN AMATEURS AND THE I.T.U.

From the chart a general appreciation can be obtained of the whole organisation, and it is possible to show how the Radio Amateur fits into the scheme.

Over 100 nations attend the meetings and **each has one vote**. No consideration of national prestige, population or the number of its Amateurs can change this. Needless to say, there are differences in the influence that nations can exercise, but when the votes are taken they have only one vote each.

Of equal importance to votes is the content of proposals submitted to the Conference. Before the convening of the Conference each nation formulates its own plans which embody the changes it would like to see made and the regulations which are needed to cover them. In Australia this is done in a series of preparatory meetings, and attended by representatives of the main user organisations. The representatives come from Government Departments, the Defence Services, and the W.I.A.

It is at this time that national policy is formulated for approval by the Government, and this is the brief which the Australian team presents at the I.T.U. Conference. If the policy is favourable to Australian Amateurs, the battle is half won. If it is not, the Australian Amateur will probably be the loser. There can be no question of Amateurs as such going to Geneva and

"fighting for their rights". Only nations have a vote, and the Australian Amateur point of view must be incorporated in the Australian national brief before the delegation leaves for Geneva. In the same way, Amateurs in every other country can only present their case through their country's national brief.

A moment's thought will disclose a very unhappy situation here. In the last ten years a large number of new nations have emerged from old colonial empires and in most cases Amateur Radio is unknown to them; to some, it is suspect. As their numbers increase, it is conceivable that they could vote Amateur Radio out of existence! And they would, too—if only to secure the frequencies for their own national h.f. broadcast systems. Every new nation seems to require its national voice on the air, and there is no frequency space available.

W.I.A. REPRESENTATION

To ensure that Australian Amateurs are adequately represented at I.T.U. Conferences, the Amateur's national organisation, the Wireless Institute of Australia (W.I.A.) has appointed a Federal Liaison Officer to attend the preliminary Conferences and to accompany the Australian Delegation to Geneva. He is Air Commodore George Pither, VK3VX, and he has been heard on the air by many Amateurs, reminding them of the need to preserve the Amateur bands.

SUPPORT FOR AUSTRALIA'S I.T.U. DELEGATION

There is obviously a need for the Australian Delegation to be properly briefed on Amateur matters, and it becomes the duty of every Amateur, as far as it is within his capacity, to ensure that every facet of the problem is known by the W.I.A. The Institute is organising an intruder watch to control the inroads of frequency pirates. The watch will also serve to keep us thoroughly up to date in this field. Reports are also needed from members on every aspect of the Amateur Service, so that, overall, the Institute can present a complete case as part of the Australian brief for the next I.T.U. Conference. This can only be done with the help and support of every Australian Amateur.

WHAT DOES THE I.T.U. CONSIST OF?

The I.T.U. is an organisation, a Union of Member Countries. In 1963 there were 119 Members and 2 Associate Members. The Union's Headquarters are in Geneva, on the Place des Nations. In this building are to be found the four permanent organs:—

General Secretariat,
International Frequency Registration Board (I.F.R.B.),
International Radio Consultative Committee (C.C.I.R.),
International Telephone and Telegraph Consultative Committee (C.C.I.T.T.).

The present Secretary-General is Mohamed Mili.

MEMBER COUNTRIES OF THE UNION: (1963) Afghanistan, Albania, Argentina, Australia, Austria, Belgium, Bielorussian S.S.R., Bolivia, Brazil, Bulgaria, Burma, Burundi, Cambodia, Cameroon, Canada, Central African Rep., Ceylon, Chad, Chile, China, Colombia, Congo (Brazzaville), Congo (Leopoldville), Costa Rica, Cuba, Cyprus, Czechoslovak S.R., Dahomey, Denmark, Dominican Rep., Ecuador, El Salvador, Ethiopia, F.P.R. Yugoslavia, F.R. Germany, Finland, France, Gabon Rep., Ghana, Greece, Group of French Territories, Guatemala, Guinea, Haiti, Honduras, Hungarian P.R., Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Korea, Kuwait, Laos, Lebanon, Liberia, Libya, Luxembourg, Malagasy Rep., Malaya, Mali, Mauritania, Mexico, Morocco, Monaco, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Overseas British Territories, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Portuguese Overseas Territories, Rhodesia and Nyassaland Federation, Roumanian P.R., Rwanda, Saudi Arabia, Senegal, Sierra Leone, Somali Rep., South Africa and S.W. Africa, Spain, Spanish Provinces in Africa, Sudan, Sweden, Switzerland, Syrian Arab Rep., Tanganyika, Territories of U.S.A., Thailand, Togolese Rep., Tunisia, Turkey, Ukrainian S.S.R., U.S.S.R. (Russia), U.A.R. (Egypt), U.K. (Britain), U.S.A. (America), Upper Volta, Uruguay, Vatican City State, Venezuela, Vietnam, Yemen. **ASSOCIATE MEMBERS:** British East Africa, Singapore-Borneo Group. **ADDITIONAL COUNTRIES SINCE 1963** include many of the new African nations, and bring the total up to **130 for 1967!!**

THESE COUNTRIES MEET every five years or so at a **Plenipotentiary Conference**.

This is the supreme authority of the Union, ultimately responsible for all policy, which—

1. **Revises the I.T.U. Convention.**
2. **Elects the Secretary-General** (who directs the General Secretariat, which is responsible for administration and finance, publication of International Radio Telegraph and Telephone Regulations, arrangement of conferences, provision for technical co-operation, financial and admin. arrangements for I.F.R.B., C.C.I.R., C.C.I.T.T.).
3. **Elects the Administrative Council of 25 Members** (which meets in annual session, when it acts for the Plenipotentiary Conference between the latter's meetings, and it supervises the administrative functions and co-ordinates the activities of the four permanent organs at I.T.U. Headquarters in Geneva).

THESE COUNTRIES PARTICIPATE IN:

- (a) Extraordinary Administrative and Special Conferences,
- (b) Ordinary Administrative Conferences;

FOR: (1) Telegraph and Telephone (Revise Telephone and Telegraph Regulations),
(2) Radio (Revise Radio Regulations, and elect the 11 members of the I.F.R.B.).

The I.F.R.B.—International Frequency Registration Board—serves as “custodians of an international public trust”; it records assignments of radio frequencies throughout the world after technical examination and it advises Members of the Union on technical matters concerning harmful interference between stations. They are assisted by a specialised Secretariat.

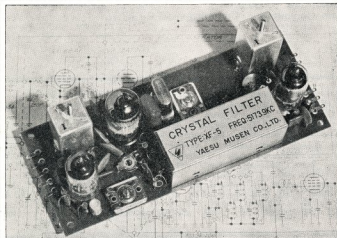
THESE COUNTRIES JOIN WITH PRIVATE OPERATING AGENCIES in the work of:—

- (a) The C.C.I.R.—International Radio Consultative Committee,
- (b) The C.C.I.T.T.—International Telephone and Telegraph Consultative Committee.

These hold **Plenary Assemblies**, normally every three years, which set up study groups to study technical, operating, and tariff questions, and issue recommendations on them; they also elect Directors who are assisted by specialised Secretariats, equipped with technical apparatus and laboratories.



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"THE THING"

(Continued from Page 8)

rather tiresome but has to be put up with.

The other pitfall results from the use of a very wide sweep. It is usual to employ a wide sweep during the initial alignment, say 10 Kc. per cm., giving a total sweep width (on my equipment) of about 50 Kc. This gives a pass band curve that is about 0.3 cm. wide. It was noticed that the top of the curve was rather peaked instead of flat. However as the sweep is reduced so is the above effect, until 3 Kc. per cm. is reached when it disappears altogether. About 1.5 Kc. per cm. was found to be about the optimum.

The distortion arising from the use of wide frequency sweeps is probably an extension of the first trouble mentioned, i.e. the rate of change in frequency through the filter is high even though the actual sweep speed is low.

The use of a marker generator was originally considered. "Finnagle" again reared his ugly head and this idea did not pan out as hoped. The trouble being that it was practically impossible to discern the zero beat point on the sides of the pass band curve due to their steepness.

That's all for this month, the remainder of the exciter will be described in a later article. I have not been able to do any further developmental work

on the transeiving side of the project. This has been due to the time taken in writing up the story so far. However, the receiver described in the August and September 1968 issues should provide a basis for individual experiments.



NEW CALL SIGNS

MARCH 1967

VK1BA—R. J. Miras, 149 Mugga Way, Red Hill, Canberra.
VK1LN—L. C. F. Whyte, 16 Bannister Gardens, Canberra.
VK1JW—J. B. B. White, Reid House, Allara St. Canberra City.
VK2BQ—M. Blackstone, Flat 8K, 85 Elizabeth Bay Rd., Elizabeth Bay.
VK2BFC—P. C. Collins, 100 Lucas Rd., Burwood.
VK2BGC—G. H. Carruthers, 9 Macarthur St., Parkes.
VK2KB—B. K. Brown, 9 Bank St., Meadowbank.
VK2BKE—K. E. Hicks (Dr.), 2/51 Cremorne Rd., Cremorne.
VK2BNC—R. C. Bell, 49 Campbell St., Boorowa.
VK2BRO—R. W. O'Grady, 13 Girraween Ave., Warrilla.
VK2BUB—B. Unsworth, Wyee State Mine, C/o P.O. Doyalson.
VK2BZZ—G. A. Bentz, Flat 7C, M.Q., R.A.A.F., Richmond.
VK2ZMX—M. A. Runagall, 5 Catherine Ave., Hillview.
VK2ZON—R. Robinson, 47 Hall St., Cessnock.
VK2ZUF—P. J. Ford, 4/86 Alt St., Ashfield.
VK2ZWT—A. J. Wright, Oak St., Dorrigo.
VK2ZB—R. Hodgkinson, 49 Vernon Ave., Gympie Bay.
VK3JS—R. C. Walker, Flat 5, 9 Thames Prom., Chelsea.
VK3AER—A. F. Leversha, Station Harcourt; Postal: P.O. Box 50, Harcourt.

VK3AUB—R. N. Buzacott, 19 Hobbs Cres., Reservoir.
VK3AVM—V. R. McKenna (Rev. Bro.), 1 Beryl St., West Essendon.
VK3ZFS—S. Farmers, Tarravannine, via Whill.
VK3ZQP—P. S. Carne, 3 Thurling St., Mentone.
VK3HB—T. T. Hopgood, 26 Everard Ave., Kewwick.
VK3NK—C. Waterman, 20 Tavistock Cres., Lywood.
VK6VG—J. V. Griffin (Bro.), St. Patrick's College, Geraldton.
VK7ZLR—S. L. Radford, 6 Bain Tee, Launceston.
VK8XI—B. Hannaford, Eido Tracking Station, Gye.
VK9CR—R. J. Conway, Station Kaia Pl., Port Moresby, P.; Postal: C/o. Posts and Telegraphs, Port Moresby, P.
VK9ZAF—A. Freitas (Bro.), Catholic Mission, Kavieng, N.G.



FEDERAL CONTEST COMMITTEE REGRETS

In the John Moyle N.F.D. Contest results, 24-hour division, the entry for section (b) should read nil, and section (c) VK5ZF/P, 561 points, 64 contacts.



OVERSEAS CONTEST RESULTS

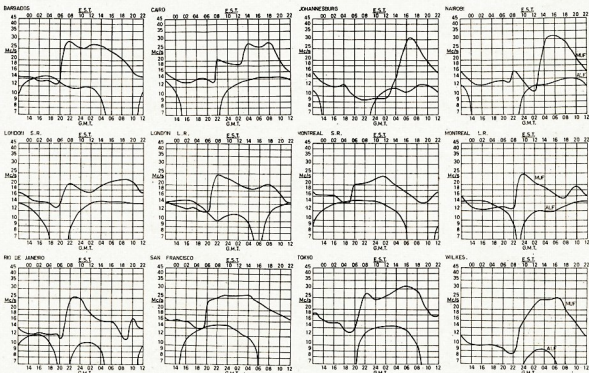
FIFTH R.S.G.B. 7 Mc. DX CONTEST (1966)

C.w. Section: VK3APJ, 50th, 850 pts.; VK5KO, 66th, 700 pts.; VK3XB, 124th, 400 pts. There were 165 entrants in this section.

Phone Section: VK3XB, 37th, 200 pts. There were 36 entrants in this section.

Receiving Section, c.w.: G. Allen, Western Australia, 1st, 1740 pts.; BERS-196, E. Trebilcock, 3rd, 1390 pts.

PREDICTION CHARTS FOR JULY 1967



(Prediction Charts by courtesy of Ionospheric Prediction Service)



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Book Review

RADIO AMATEUR'S HANDBOOK 1967, 44th Edition

Published continuously since 1926, during which time almost four million copies have been sold, this handbook has become the standard manual of Amateur Radio communication, as well as being an excellent reference work and training text for students.

The chapters on radio communications theory are up to date in all phases of the art, and the material on equipment construction includes transmitters and receivers for every level of cost and constructional ability. Very few special components are used and the frequency ranges catered for are similar to Australian Amateur frequencies.

Much helpful information is provided on mobile operation, antennae, test equipment, sideband and teletype.

The information on tube and semiconductor characteristics, and tube base diagrams, provides one of the most complete such listings to be found.

Perhaps the only criticisms are that this edition is little different from the 1966 edition and the attention given to semiconductor circuitry is still only slight.

Published by American Radio Relay League, Connecticut, U.S.A. Review copy from the A.R.R.L.

WORLD RADIO T.V. HANDBOOK 1967, 21st Edition

Over the years this handbook has become a must for every serious shortwave listener. The first section contains interesting articles relating to broadcasting, information about broadcasting and television organisations, technical articles and tables of practical value to listeners.

The main section of the book contains detailed information, by country, of the radio stations of the world, including addresses, frequencies, transmitting power, call signs, and station names. Also included is detailed information of programmes, including time, frequency, and beam areas of broadcasting in each language.

Not the least interesting section of the book lists the shortwave stations of the world in frequency order, enabling rapid identification of received signals.

Published by World Radio T.V. Handbook Co. Ltd., Denmark. Australian price \$8.00. Review copy from Technical Book and Magazine Co., 289-299 Swanston St., Melbourne.

HOW TO BUILD AN INEXPENSIVE TRANSISTOR RADIO

Although of a standard well below usual Amateur Radio standards, this book would be an excellent answer to the many queries most radio enthusiasts receive from young people wishing to start out in electronics.

The radio described is a simple one transistor regenerative unit employing an OC44. The text is simple and clear, and extremely well supported by excellent diagrams and photographs. So much so, that a young schoolchild should have no difficulty in following the instructions without assistance.

Published by Beta Books, N.S.W. Australian price 75 cents. Review copy from A. H. & A. W. Reed Pty. Ltd., 51 Whiting St., Artarmon, N.S.W.

Galaxy V. Mark II. and Swan SW350, latest models, all-band SSB Transceivers \$550

Gonset full Two Metre SSB Transceivers \$400

Heath HW-32A 20 Metre SSB Transceiver Kits \$180

Heath HA-14 400w.-plus p.e.p. output linear amplifier kits, requires external 1800/2000 volt power supply \$175

Hy-Gain imported Antennae:

TH3JR 10-15-20 Mx Junior 3-el. tri-band beam .. \$100

TH6DX 10-15-20 Mx senior 6-el. tri-band beam .. \$210

Newtronics latest all-band Vertical 4-BTV with 80 Mx top-loading coil \$70

Webster Bandspanner all-band Mobile Whip with bumper or body mounting kit .. \$50

DC-DC 12 volt Mobile Power Supplies \$90 and \$100

Antenna Rotators, CDR Ham-M, heavy duty with 230v. indicator-control unit .. \$180

Co-ax Baluns, 500w. rating, for dipoles and G5RVs, \$10

Co-ax Connectors: PL259, SO-239 and VHF N-Type 75c

Crystal Filters, plug-in type, 5165-5325 Kc. \$15

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Sub-Editor: D. GRANTLEY, W.A.12022
P.O. Box 222, Penrith, N.S.W.

In the column of the May issue of "Amateur Radio" I briefly outlined the "doings" of the short wave listener in response to this has been such that we will continue this month, and elaborate a little on the subject of receivers, followed in a later issue by some data on amateur reception.

The choice of a receiver is governed by the field of operation which the S.W.I. chooses and the amount of money he has available. If he is intending to concentrate on the Ham bands alone, there are many commercial receivers available for this purpose, including a number of the Japanese receivers which are available in this country. I have used only one of these and it performed quite adequately on frequencies up to 20 metres, however performance dropped away on 15 and 10, which is to be expected. I was using this receiver for the R.D. Contest in 1963 when band conditions were well below their present level. If you intend to listen to anything and everything, a general coverage receiver is necessary, in fact there are general coverage receivers available which have handspans over the Amateur bands. This of course is the ideal set-up for listening.

It is well to keep in mind that the receiver must be extremely selective in the portion of r.f. which the antenna feeds to it, and that any short-cuts in its construction will naturally impair the result. But get back to the starting point, let's presume that the would-be S.W.I. has \$30 to spend on his first receiver and wants to listen to anything he can hear with confidence on the Amateur bands. If he is an experienced telegraphist he will be able to listen to Morse signals up to maybe 10 wpm, and he can be heard in abundance on a home-made regenerative or T.F. receiver. However, once again we must presume that our listener is a complete beginner, and he will learn to follow simple telephony before he graduates to operating single sideband. As there is very little a.m. (normal) work on the DX bands, he will have to listen to 100 if he is fortunate enough to hear a signal, otherwise 80 or 40 metres. Therefore the first filter he must have is one which gives reception on these bands, and up to say 10 Mc. This gives him general coverage up to a little higher than the 40 metres band, and overcomes many of the commercial stations and local point to point communications.

What must this receiver have? Firstly, it must have a variable band frequency oscillator, and without going into theory, this is necessary to provide a means of making single sideband transmissions audible, as well as providing a readable note for Morse signals. I emphasise the need for a stable b.f.o. as the slightest shift in this circuit will give the receiver a signal, the r.f. amplifier too is a crucial part of the circuit, once again I will leave the theory to the Youth Radio Scheme and spend a few words of remarks.

With no radio frequency stage you will hear images or repeats of any given signal in more than one place, the addition of the selective filter and amplifier amplifying the basic signal and rejecting the image, whilst a second r.f. stage really puts the receiver in business. So, the minimum that one can have is a r.f. stage, the set the necessary "sensitivity" to lift the weak signals. Then as well as all this we must have a "selective" receiver, that is one which has the ability to eliminate unwanted signals and this can become quite an expensive addition. But in these days of crowded bands it is so easy that we have some devices to perform this function, the said device is called a filter, and can be of the mechanical type or the older type using a quartz crystal. The simplest device however is a Q multiplier and details of this can be found in a handbook such as the A.R.L. Handbook, or the Novice and Technician Handbook, to name two of the regular ones.

So now we have a receiver which has stability, sensitivity and selectivity, and is between approximately 2 and 10 Mc. and is capable of receiving any type of transmission, made, then you will have the basis for future operation and extension when you move into the DX bands on 20, 15 and 10 metres.

Now for the actual choice of receiver. Watch the columns of this magazine, or even advertise in it. Listen to your Divisional broadcast and join your W.A. group, or the Bulletin, or contact other members of the

various S.W.I. Groups, thus you will be able to buy a receiver more to your need and far cheaper than other sources.

Of the various receivers on the market at the present time, I had the use of several types of these wartime receivers and most of them are quite adequate for a beginner, and for further use on the DX bands when he has more experience. One of the most famous of these is the AR1. This set has two r.f. stages, an in-built crystal filter, power supply and all the features of a first class communications receiver, but one fault is that it sometimes lacks stability. Frequency range is from below the broadcast band to 28 Mc. It covers up to 15 metres, but at this frequency they tend towards instability. However for a basic set they are quite okay. The same applies to the AM350 and the HRO. The HZ42-248 series are also excellent if you can get an unmodified model, and the SX20, although old, will still match the best of them. Then we had the Super-Pro, another excellent job, as was the CR100. Probably the best of the lot would be the AR85 series, and these even now sell at a price well above any of the others.

The types named up to here are all general coverage communications receivers which were the best of their day and which can be obtained fairly reasonably these days. There are others which served a lesser duty, for example the No. 4, with its cast alloy chassis and most stable b.f.o. This was quite good for its purpose and would be ideal for a beginner who planned to extend its range with converters, a subject which we will cover later. In this category comes the NO. 10, the set of which I used with extremely good results when I first joined the VK2 S.W.I. Group many years ago.

There is little more I can add at this point. As space permits I will continue this series, but in the meantime I would like to hear some comments from users of current commercial gear, giving their opinions and suggestions which I can pass on to the newcomers who frequently write in for information on this subject.

DIVISIONAL NOTES

VK3 Group: The construction night which formed the May meeting was attended by only half a dozen members, which to say the least was disappointing. R. Girdo was elected Vice-President and Liaison Officer. All QSL cards received by the QSL Officer have been despatched to their owners.

VK3 News: A recent development in the change to be made to the Victorian Group magazine "Zero-Beat". It has been decided to combine the Y.R.S. and S.W.I. notes in the one magazine, the circulation and income will go up. The S.W.I. Group is brought to the notice of the Y.R.S. members. It may be eventually possible to increase the number of pages in each copy, or even produce the magazine monthly. Recent correspondence from the Hamilton College indicates that possibly six of the boys will join the VK3 S.W.I. Group, a nice increase to our country membership. The Group would like to see a better attendance at the meetings. Don't worry about the cold room for plenty of heating is available and the lectures are interesting.

AROUND THE SHACKS

Alan Rafferty, L5005, has QSLs from UB-SARTEK, TFI, UB, XWAZ, GZAKQ, OH5NW, JA4BJO and IICAM. Ted Gregory, ex VS8EC is at R.A.A.F. HQ, Penrith, and I have not heard of his acquaintance. His XYL is Inge VKGVO.

Such is life. Last month I was abusing everybody for not writing. Eric L5042 is very

happy about the number of VK3 chaps whose cards are passing through the Bureau, but is not doing too badly himself either with a score of 200 during the 40 Zones, and 225 cards, 1000 in 40 Zones. Inward cards: DM2AQF, DM3W50, DLASA, F8BT/FC, G3IAR, G3KSH, H1WFI, SP2KA, TAAJ, YEW7W, YB5AH, VS8ARY, VS8RY, VS8MM, YUZYKZ, TX0AH, VK3AX/M, G3U/B/MA, G3U/B/MM.

Our overseas correspondents, Art Borredale, now transfers from W to EA, and hopes to do actual listening from 40 Zones, and John Simons who has been providing some interesting news on v.h.f. doings in G land, now moves to another country. That winds it up for this month chaps, 73 for now, and don't forget the R.D. Contest. Don L2022.



YOUTH RADIO SCHEME

It is with pleasure that we announce that Mr. Keith Howard, VK1AKX, President of the Victorian Radio Society, will be taking over the duties of F.ederal Co-ordinator from Mr. Rex Black, VK2YA. Keith has been a very active promoter of Amateur Radio for many years and devotes many hours each week to the club including Saturdays for Y.R.S. Keith is also a teacher by profession and is an excellent and successful teacher. Our best wishes to you, Keith—and for the future of the Y.R.S.

The first Y.R.S. Conference was held over the weekend of June 3 and 4, 1967, at a meeting of officers and club leaders, at Sydney Grammar School on the first day. On the second day, the W.I.A. headquarters at Crows Nest was open for a get-together of those interested in the Postal Groups. Roger VK1RD, Postal Group Supervisor, was there to meet as many people as possible.

Rex Black, VK2YA, has written from England to say that he will be back in Australia and at work some time around August 1. Rex had a bit of news about various youth activities in England. Y.R.S.'ers should feel very fortunate in being able to use radio gear under supervision of a licensed Amateur for in England this is absolutely illegal. G3TGS is the call sign of the Scout Radio Club operating from Baden-Powell House in Kensington. It appears that the revised training methods English Scouting will include some attention to Amateur Radio.

Speaking of Scouting, do not forget that the Junior Scouts of the Air take place August 6 and 7. So if you know of a Ham in your district do not hesitate to approach him. A little preliminary instruction on the use of the mike, what to say, etc., helps keep mike shyness at bay and leaves a good impression on the other half of the QSO party.

Alan Rutley, of the Meadowbank High School Radio Club, was formally presented with the O.T.C. book prize for gaining 95% in the Elementary Certificate at the last meeting of the Wireless Institute.

John Flynn, of Canterbury Scout Radio Club, advises that his club is following a construction programme this year which will give the boys a valuable experience.

There have been several more successes for the Elementary Certificate. C. Zivrilis, of Roger Davis P.G., gained 92% and, therefore, will be eligible for the O.T.C. prize.

Don't forget to send me your news by the last Wednesday of each month. The address is Mrs. M. Swinton, VK2AXS, P.O. Box 1, Kilmara, N.S.W. Best 73, Mona.

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ROSS HULL V.H.F. CONTEST

Editor "A.R.", Dear Sir,
An Amateur among the results of the 1966/67 Ross Hull Contest could be forgiven for concluding that the Contest could be discontinued because of apparent lack of participation. However, the Federal Contest Committee cannot be pardoned for allowing "irresponsible sensationalism" to be published as its official report on the Contest.

The F.C.C. begins its report in a gloomy fashion: "Again this year we saw a very poor response to a national contest". The 1966/67 Contest, held during a period of sunspot minima, attracted an entry of approximately 20 logs, whereas the 1966/67 Contest attracted about 40 logs, an increase over the previous year of 100%. How, therefore, is the F.C.C. justified in using the phrase "again this year". The F.C.C. report then continues: "When only 0.7% of licensed Australian Amateurs participate in a contest, perhaps it is time to either re-write the entire set of rules or discontinue the contest."

Upon checking the results of the 1966 John Moyle National Field Day Contest, it was found that in this case only 0.7% of all licensed Australian Amateurs submitted logs to the F.C.C. Further, a check on the phone logs of the R.D. Contest DX Club, which produced a participation figure of 0.6%. The F.C.C. reports printed with the results of the above two Contests did not mention the possibility of discontinuing them because of the apparent lack of participation. Why, therefore, does the F.C.C. choose to single out the Ross Hull Contest, which they agree has a participation figure of 0.7%?

In recent times, the rules of the Ross Hull Contest have been re-written so that the present Contest is very different to the Ross Hull of a few years ago. But the F.C.C. blatantly suggests that the entire set of Contest rules should be re-written again. How can the spirit and tradition of the Contest flourish from year to year if the rules are being continually changed?

The F.C.C. report goes on to say, "It is difficult to understand the apparent lack of interest and apathy on behalf of the other 99.3% who do not enter the Contest." On the contrary, it is not difficult to understand why so few logs are submitted. Because the Contest runs for a month and as the most active stations swap contest numbers nearly every day, the probable results of the Contest are known even before the Contest finishes! If an Amateur knows he has a lower score than someone else, what then is the use of spending hours writing out a contest log when he knows he cannot win?

The F.C.C. should note that in this respect the suggestion that anyone who submits a log with over 100 contacts should be given a certificate, of merit. Precedent for this has been established by the John Moyle Field Day Contest. Of the 46 entries received by the F.C.C. in 1965, 20 received certificates.

On the question of Ross Hull participation, the F.C.C. states that 99.3% of VK Amateurs did not enter. A simple fact can be written in different ways. The word "written" can imply a different meaning. Thus the text of the above can be re-written in the following manner and still remain true. "Written by the Division winner, I can say that I made and heard many contacts during the Contest. Of all the hundreds of v.h.f. stations who operated during the Contest, not one was heard to refuse to give a contest number when so asked."

Thus I can only draw the simple conclusion that the Ross Hull Contest needs more participation from all Amateurs active on the v.h.f. bands during the Contest. How then can the F.C.C. conclude its report by stating that the Contest be made more popular than it is now? Because of the 100% participation by all Amateurs active during the Contest, the Ross Hull must be the most popular of all the National Contests.

It is now an opportune time to record some of the proposals that have been mentioned in VK4 as a means to improve the Contest.

1. A certificate to be issued for logs showing more than 100 contest contacts.
2. Delete sections A and C from the Contest.
3. U.h.f. contacts not to be counted in determining the trophy winner.
4. Adapt the R.D. Contest idea to this Contest, viz. State V.h.f. Groups should compete for a trophy.

Readers of "A.R." have noted the F.C.C. report on the 1966/67 Ross Hull Contest and will by now have read this par. Is the opening remark "irresponsible sensationalism" in fact a fair comment?

—P. J. Lindsay, VK4ZPL.

PREDICTIONS

Editor "A.R.", Dear Sir,
In reply to VK2QL, that forecast was made by Dr. King-Rele, Royal Aircraft Establishment, Farnborough, England. I read it in early February, it would have been published in England in early January, so it would have been made some time in December. As it seemed most unlikely to me that it was worth much in view of current sunspot numbers, I am afraid I made no record of where I read it. I think it was in "New Scientist," but I am not sure.

In discussions on the air it is obvious that VK2QL's excellent article on short range month to month predictions was widely read and appreciated. There would be equally great interest in a sequel on long range forecasting, especially if it got to that famous one, "we would not again reach high sunspot activity in the present century", who made it; how did they make it and is it worth anything more than the paper it is written on?

—A. K. Head, VK3AKZ

THAT LAST 500 Kc.

Editor "A.R.", Dear Sir,
I have been on the air for just on a year, mainly on six metres, and have heard many discussions with regard to the use of the last 500 Kc. of six metres and 146-148 Mc.

At the risk of being howled down by the masses, may I add my plea to those of other Amateurs who feel these frequencies are in danger of being lost if not activated and activated soon. In "A.R." we read "Amateur frequencies—use them or lose them"—and once lost can never be regained.

Surely there are Amateurs who would like to start up new nets on these frequencies, even if it means a bit more effort in returning the rig. I am sure that if there were enough support, the top end of 6 and 2 metres would become active in no time at all.

—David Thomas, VK3ZVT

SIDE BAND

(Continued from Page 13)

The method of generating the sideband at final frequency was used in the Heathkit SB-10 s.s.b. generator, so this is not new, but the 7380s appear to be much more stable as balanced modulators than the 12AT7s. Handle your 7380s with care at all times as many people have told me that they can become intermittent with grid-cathode shorts, particularly after roving off the table. "Wireless World" may be found in most local libraries, if you are unable to find March and April copies on the bookstalls.

It is quite interesting to note that surplus external anode tubes such as the 4X150A and its later versions such as the 4CX250B, may be used in ceramic "lokal" sockets, if screen supply feed and by-passing to chassis are improvised in the best VK tradition. The blower should not be forgotten—cheap a.c. motored hair-dryers with heaters removed are ideal, and the anode may be boxed in with "red fibre" insulating board to ensure that the air blows through the fins to achieve the best cooling.

Even if you are one who does not approve of phasing type exciters for s.s.b., the above articles may give you some rather different, new ideas.

73 for now, Phil VK5NN.

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FEDERAL AND DIVISIONAL MONTHLY NEWS REPORTS

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FEDERAL

FEDERAL INFORMATION BULLETIN

From J. Batrick, VK3OR, Federal Secretary

QSL Bureaus: Mr. Ray Jones has decided not to give up as Federal QSL Officer, but will continue under a new system suggested by himself.

I.A.R.U. Conference is to be held in Montreal from 1st to 4th July, 1967. Any Amateurs who are attending "Expo '67", or for other reasons will be in Canada during that period, are asked to contact the Federal Secretary.

Booklet, "How to Become a Radio Amateur": David Wardlaw, VK3ADW, has agreed to take over this project, and see it to fruition, and will incorporate suggestions from Divisions received last year.

A.R.R.L. President Dennesson: Unfortunately, his trip to Australia has been postponed because his wife is ill. W.I.A. has conveyed his regrets and sympathy, hoping for a speedy recovery, and hoping he eventually does come to Australia.

A.R.R.L. re D.X.C.C.: A supplementary statement has been received from A.R.R.L. Awards Committee re the suspension of W9WNV. Don Miller's membership in D.X.C.C. and credits for various DX-peditions, pending further information.

A further communication from A.R.R.L. announced as follows:

- (a) Navassa Island (KIIMP/KC4): D.X.C.C. credits withdrawn.
- (b) Laccadive Islands (V9WNV): D.X.C.C. credits withdrawn.
- (c) Aldabra (VQ9AA/A): Suspension lifted.
- (d) Des Roches (VQ9AA/D): Suspension is lifted.
- (e) Giorio (FR72P): Suspension lifted.
- (f) Minerva Reef (IM4A): Suspension lifted.

In regard to items (c), (d), (e) and (f) the D.X.C.C. credits will continue to be granted.

A.R.R.L. Technical Merit Award: The Board of Directors, A.R.R.L., at a recent meeting unanimously voted to grant the A.R.R.L. Technical Merit Award jointly to Ray Naughton, VK3AAN, and William Connel, W6DNG, for their outstanding accomplishment in the moonbounce field of v.h.f. signal propagation.

R.D. Contest 1967: Executive has approached the Hon. Allan Fairhall, Minister for Defence, to open this year's Contest. He has gladly agreed, and the VK2 Division will be asked to prepare and distribute the necessary tapes.

S.S.B. Equipment: The P.M.G. Dept. has indicated in a letter of 2/9/67 that it is prepared to accept as meeting the proposed 400 watt p.e.p. output limitation, the Swan Electronics Transceivers, Types 240 and 500.

DEATH OF FEDERAL AWARDS MANAGER

We regret to announce the passing on 26th May of Alf Kiskick, VK3KB. Executive sent floral tributes and condolences.

Alf was a well-loved and well-known DX operator and gave many years of devoted service to W.I.A. and the Amateur Service generally.

A very good friend of Alf's was Bill Hempel, VK3AJO, also a well-known DX'er. Bill has agreed to accept appointment as Federal Awards Manager. His address is Kyvalley, Tongala, Vic.

JAMBOREE ON THE AIR

This year's Jamboree will be held on the week-end of August 5 and 6, which is two months earlier than usual—and the week-end before the R.D. Contest.

The Australian Boy Scouts Association has approved Branch Contests in each State.

New South Wales: D/S/L Brian H. Anderson.

Victoria: Mr. Jack Nicholson.

Queensland: H.Q. Commissioner Barry Smith.

South Australia: Field Commissioner Basil Dennis.

Western Australia: H.Q. Commissioner John Leach.

Tasmania: G/S/M Ray Jeffrey.

Papua-New Guinea: Mr. Peter Whitlock.

This year KTW5L—World Scout Jamboree—will be set up at Tarragut State Park, Idaho, U.S.A., from August 1 through to August 9.

This year is the Diamond Jubilee year of Scout and Scout from 20 countries will be attending the World Jamboree. Station KTW5L will be manned continuously during the week-end of August 5 and 6 and will use the following frequencies on phone: 3.595 Mc., 7.290, 14.290, 21.290, 28.290 Mc.

INTERNATIONAL AWARD

"CHRISTOFORO COLOMBO"

Each year this award is given by the Institute Internazionale delle Comunicazioni di Genova, Italia, to Radio Amateurs who distinguish themselves—

(a) "For offering their activity as an Amateur and their co-operation to highly human and social work" (collaboration with public authority on occasion of public calamity, etc.).

(b) "For their contribution with experiments, constructions, etc., to the development of the technology of communications—not a professional one."

Nominations for this award could be sent to Executive for consideration. (It was interesting to note a picture of W. Orr, W6SAI, receiving this award in "QST" or "CO" recently on behalf of the Project Oscar, it is a highly prized award—any worthy VK activity?)

NUMBER OF LICENSED VK AMATEURS (FROM VK3RN, Call Book Compilation)

	January	February	March	April	May	June
Full	VK1 1293	VK2 1114	VK3 458	VK4 476	VK5 262	
Limited	14	391	502	166	200	121
Total	81	1604	1616	624	676	383
						Grand Total
Full	VK7 129	VK8 15	VK9 61	VK0 7		3082
Limited	—	—	9	5	—	67
Total	196	20	68	7	—	3395

	February	March	April	May	June
Full	VK1 87	VK2 1201	VK3 1115	VK4 476	VK5 262
Limited	14	392	517	170	202
Total	81	1607	1632	626	678
					Grand Total
Full	VK7 128	VK8 16	VK9 63	VK0 7	
Limited	67	9	8	0	
Total	195	21	71	7	

MEMBERSHIP		RETURNS FOR APRIL				
	VK2	VK3	VK4	VK5	VK6	VK7
Hon. . . .	—	—			—	—
Life	15	15			6	7
Full	859	813	No		233	143
Assoc. . . .	398	243	Returns		67	80
Others	10	—			—	—
Total	1282	1071			306	230
(Pre. Total)	(1298)	(1061)			(303)	(229)

NEW SOUTH WALES

COUNCIL NEWS

The N.S.W. Council has again tried out a new idea, that of meeting at 6.30 p.m. The first meeting did start until 7.15 p.m. due to the fact that the President and Vice-President both had transport difficulties. Subsequent Council meetings have been started almost on time, but have not concluded much earlier than before, due mainly to the vast amount of accumulated correspondence requiring attention.

SILENT KEY

It is with deep regret that we record the passing of:

VK3KB—Alf Kiskick.

An upsurge of interest in Amateur Radio clubs appears, with the formation of clubs in country centres. Clubs are being formed at Parkes, Muswellbrook and Maitland. Council wishes to remind clubs to send full details to the Division at 14 Atchison St., Crown St., Councillor Henderson is the Country Liaison Officer and Cyril will see that the club gets good publicity in the 271 broadbands area in the Bulletin; this being in order to inform Amateurs in the local area of the club which they may care to join and support. Should the club wish to embark in training or catering for juniors, then clubs are recommended to the Youth Radio Scheme conducted by the W.I.A. in N.S.W. If this is the case, then Councillor Dave Jeans will assist in the Y.R.S. liaison area.

Council is very anxious to assist and encourage clubs to be formed in country areas, both to foster the interest in Amateur Radio and as a by-product to provide a station for future W.I.C.E. use should it ever be required.

MAY GENERAL MEETING

Despite the lack of railway transport on this occasion the meeting was well attended and was opened by the President Keith Finney. Following the usual formalities, the President reported to the meeting on the appointment of a Secretary. The President advised that Council had passed a motion that a paid Secretary be engaged. Discussion ensued on this matter and resulted in a motion that the appointment be deferred for further discussion at the June meeting. The President then stated that he had this motion in motion, vote of no confidence in himself or Council; and then said that he was resigning and left the meeting. Vice-President Bill Lewis then took the chair and suspended business. Then several slides taken in Vietnam by VK2AIF/VX5 were shown. Following the slides a film was shown on the manufacture of valves and transistors and intermittent fall in the speaker led him not to assist the screening.

Following the screening, Bill then re-opened the meeting for business. After a short discussion, a motion was moved and passed to the effect that Keith reconsider his decision to resign. The motion was carried. Council considered the business involved, it was not possible to admit new members at the meeting so the applicants will now be presented to the June meeting. No additional appointments were announced and the Hon. Secretary, Mrs. Gerdie, is continuing on until the question of the Secretary has been resolved.

Subsequent to the general meeting an informal meeting was held between the President and Councillors on the 29th May. At this meeting Keith agreed to call the President and the Council decided to make the general meeting in June a Special Meeting and in view of the events at the May meeting it was decided to notify all members by mailed notice of three items to be presented to the meeting for discussion. The three items being:

1. To hear a report of the Auditor on the financial ability of the Division to employ a Secretary.
2. To hear a statement on the legal obligations and powers of Council.
3. To consider a motion of confidence in Council.

Your correspondent was not able to obtain an up-to-date statement on the situation for "A.R." as the President is overseas for several weeks and does not expect to return before the June Special Meeting. The General Meeting was held on 23rd June as previously announced.

ILLAWARRA BRANCH

The members of the Illawarra Section have again been holding meetings in Wollongong, and in reply to a letter to Council, two Councillors, Messrs. Campbell and Henderson, went to Wollongong and met with the members and amongst many things discussed the procedures for the Section becoming a Branch. Subsequent to further meetings of the Section, an application was made to Council for approval for the Section to become a Branch. Council unanimously approved the request so that the Division now has an official Branch.

Amateurs in the Wollongong C.D. area are eligible to be members and are asked to assist the new Branch by attending meetings and helping out with the many jobs involved in getting the new Branch firmly established. It

lowed by a Question and Answer session, when members were invited to ask questions on any aspect of their hobby.

Among the visitors to the meeting was David W. Smith, W3MT from the "Clan Malcom" looking for a.m., c.w. or s.s.b. contacts on 40, 20, 15 and 10.

Max Patmore, who is soon to line up for National Service, was granted honorary membership for the term of his service.

A club member who managed to center Kevin IARD during Kevin's recent visit to W-land. Phil SAPO reported that there are a number of 50 ft. wind-up towers going begging in certain areas now serviced with local tv. Prices are apparently quite low if you have the facilities to dismantle and cart them away.

Visitors are always welcome at the Moorabin Club at meetings on the first and third Friday of each month, and are always welcome in some time? For directions on how to get there, see last month's "A.R." on page 96-2414 or 93-6285. 73, Alan 3ASL.

QUEENSLAND

IPSWICH AND DISTRICT RADIO CLUB

A recent article in "Amateur Radio" by the Bundaberg Amateur Radio Club has prompted me to let the Ham fraternity know a little about the Ipswich Radio Club.

This club has been in operation for almost five years now, and was originally started by a few keen S.W.s who invited the local Ham community to join them. Since then, the club has expanded until, at the present time, it has 38 members.

In Ipswich, we have erected our own club house on a piece of land donated to us by the Ipswich City Council. This allotment is in a situation which offers the highest view in Ipswich and has commanding views to south, west and east, and best of all—it is almost noise-free. A beautiful spot for Hamming, not least only a half mile from city centre.

After levelling the scrub on the site, we erected a club house at a donation of £100. The old office block from a disused coal mine helped us considerably with the building which measures 36 x 18 ft. and contains a well-appointed kitchen, a complete built-in cupboard and stainless steel sink, and painted in gay colours; also the shack, our pride and joy. It is 12 ft. high, a little bare at the moment, as we only have our BC342 in it, but by the time you read this we hope to have our complete 6 metre transceiver, which Jack 4SF is constructing. The antenna system, at present, is a 20 mx dipole and an 80 mx inverted vee. We hope to improve this in the near future.

The remainder of the building has just been recently ceiled and is used as our meeting hall and contains a very large screen for the social functions the club has. Our meetings are held every fortnight on Tuesdays, and are welcome to attend, especially Interstate Hammers. We have a very good time.

A call to our Public Relations Officer, Bill Jehn, at Phone 81-3629, will soon get you all the information you need. We are so keen, I can assure you a rag chew will be welcome. Although the club is not strong numerically, we all pull together. This is a big thing in such a small club. We have 11 full licenses, 3 limited licensees and 6 s.w.'s, also not to forget our YL and XYL members who bring up a most lively and enjoyable time at our meetings nights making the supper and washing up. I only hope this plug for them does not get too long and that we have a strike on our hands—only in fun girls.

Club nets are held every Monday at 8.00 p.m. on 3850 KC and the members would like as many members as possible to join. Bill and John in whenever we are heard. Our other net on 83.02 MC was once very popular, but unfortunately we have had to abandon almost every morning at 6 a.m. and after the VK4 Divisional news on Sunday morning. Our odd hours of netting are necessary for the use of the recent building and antenna installed on Mt. Cootha.

A certificate is available to any operator or s.w. who who work the club station VK4 and any two members and, on receipt of QSLs to all three stations, the certificate and special QSLs for the following year will be sent by air away to v.h.f. stations in VK4 and very

few to any h.f. stations, and only one away to a DX station, namely WIDBM.

Without a doubt, much of the club's success has been accomplished by their social activities, which enables both members and their families to participate. This has allowed the members to get together and talk radio to talk, allowing the club the chance to talk over latest fashions or the latest DX country the OM worked recently. These social outings are barbecues, picnics or a night at the club house, and our dinner party, which are famous throughout the districts, usually XYLs versus OMs, and this is a fine opportunity for XYLs to break even on OMs under the name of sport. Also numerous Sunday round trips are had, all cars working mobile on 8 mx all the way.

Officers in the club are Norm 4KE, President; Roger 4RG, Vice-President; Alex 4QT, Secretary; Joan 4YL of 4ZLG, Treasurer; Wayne 4ZD, Station Manager; Bill W1A-14001, Public Relations Officer. Licensed members are Jack 4SF, Dave 4HW, Col 4ZMA, George 4ZLG, Stan 4SLA, Bill 4UB, Phil 4ZPE, Bob 4JR and Warren 4GT, and numerous other S.W.'s and XYLs.

Bill, our Public Relations Officer, recently retired from work. I don't know if his recent appointment to the club has anything to do with it, but Bill reckons the VK4s are getting their share of DX by the number of cards he ships out. Dave 4HW may soon be moving from the farm near Lake Manchester, the next QTH may not be as good Dave, so get all those countries for VK4 DX before he leaves. Our Station Manager, may have to delay his new s.a.b. transceiver project since he has taken up b.e. operator's course at college. 73, 4GT.

TOWNSVILLE AND DISTRICT

As promised in my last notes, the trip to Cairns and reported. Basil 4ZW was called upon by his club and our district except 4ZJ MC, and that the Z boys were having a whale of a time working the JAs with some openings in the wayward weather. The district's distinguished visitor to the north was 2SG. While in Townsville he was the guest of 4ZK and 4ZJ, and a social visit to the club for the weekend. He also found time to visit some of the other boys and took the advantage of calling for the evening on the writer and tried to brew.

Merv 4DV back again at work after the annual camp of C.M.F. Put most of the time in the bush.

It appears that one of the local High Schools is starting the Radio Scheme, while Norm BNT informs me his prize at the local Grammar School was the original set-up. The same set-up. Norm is donating a receiver for this purpose to the School.

The two sessions going on Saturday morning, 8.30 to 9.30 (new class) and the second for the advanced classes, 9.30 to 10.30 a.m. The instructors are to be commended for their enthusiasm. The 1 is reported the president of the club, Peter 4ZEE, is resigning from the R.A.A.F. and going back to work. I am sure that Peter will be missed as he was very keen on the club activities. 73, Bob 4RW.

BUNDABERG AMATEUR RADIO CLUB

Another month gone and not terribly much activity, radio-wise. Most of the time and energy of the club members spent going to the State W.I.A. Convention at Alexandra Headlands and a static display in the Bundaberg Civic Centre for Youth Week. The Youth Week display was a success and drew a large young people of the city, and as a result, we hope to recruit some new members.

Glad to hear Frank 4KJ back on the air after a long absence. With next year we have had, Frank could not use the old excuse of irrigating his fruit trees any longer. Heard that Frank had taken up a new job, but much to the disgust of Les 4XS, at Kingaroy. Les tells me he just gets a fellow Amateur Radio operator to take up the job, but he is able to work John easily on 6 mx. But, be prepared, you 6 metre fiends, John is coming up on s.a.b.

John is temporarily off the air with another burnt up transformer. That is two in two months. Les, better take a long deep look at his time.

Six metres is open spasmodically to VK3 as late as last week. Crazy sort of turn-up with the Southern states, breaking up our cozy little 6 metre time.

Congratulations to Dave McGroarty on the allocation of his call sign, VK4DJ. Dave should be able to get to the top of the heap. He made a very nice job of re-vamping his h.f. disposals receiver.

We will see the club old boys' reunion the other night with Les 4XJ at Brisbane, John

4XC at Nobby, and Bill 4XZ at Charters Towers. Just as well they have moved anyway—too much QRM if they were still here. 73 for now, Rusty.

SOUTH AUSTRALIA

The monthly general meeting of the VK3 Division was held in the room to a good attendance of members and visitors, and when one considers that the night was almost a record for the club, it was a most gratifying and also went to prove that the record low attendance of the April meeting was just one of those things due to the change of the purpose of the meeting, instead of the record time.

The President, Murray 5ZQ, opened the meeting on time and disposed of the business side of the meeting in a most efficient manner. had a short smoke-off, George 5RX distributed the QSL cards, and the lights were lowered for the purpose of listening to the record provided by VK2 which accompanied the tapes, also from VK2.

The first tape recording was on communication of the section, followed by the second tape on transistors, and VK2 are to be congratulated on the excellence of both tapes, and the excellent work of the section. The given, to say nothing of the circuits on the slides. Ron 5KS acted as slide putter-inner and taker-outer, and except for having us all stand on our heads once, he did his usual excellent job.

Among the welcome visitors were Mac from Charters Towers, who is a member of our club on the island which boasts the call sign VK0X1, who is spending his holidays in VK3 and faked a meeting in the club house. Visitor, Wally 4ZLTCW, now a VK5 resident and soon to take out a VK3 call sign, who, incidentally, looks like a find for the club. The section also had a number of visitors on the v.h.f., and willing to be in everything that is going.

Among the expected visitor, although he has been a member and licensed for a long time but I care to remember, was Allan 5ZX looking as young and active as ever, and accompanied by his wife, who is a member, who is apparently responsible for his comeback to Amateur Radio after all these years. He was a bit of a shy fellow, but after nudging him into putting the 6 mx mobile in the car and frankly admitted that he had not enjoyed himself so much for years and was glad to get back to you. So you back OM—and you too Christopher.

Rob 5WA slunk away into a corner of the club house, and after a short time, when he cornered him eventually, he explained that he was not too sure that I would speak to him any more. He said, "I don't know what the hell is going on. Controlling my emotion and standing up to the situation in my well known soldierly manner, I explained to him that I was receiving a little more in the back these days that I had come to accept such acts of fate. He now has s.a.b. to say nothing of a slushy bath, and is more than satisfied with results. He also informed me that all the pigeons in North Adelaide now come and perch on the said beam.

Our General Treasurer, only genial when the money is flowing in, reported that he contacted Tubby 4NO on 28 Mc. recently and Tubby's report was that he was still in the game. Eido Tracking Station—QTH given as Gove.

Although there has been no sound from Fred 5ML since coming to the from Renmark, I am sure that he is still in the game. All that is going on and no doubt will be bitten by the bug ere long.

It is a pity that Murray call sign not heard in years is that of Hurtle 5RE, who lives at the foothills suburb of Linden Park. He is still a member of the club, and has been in the club and this has now become his main hobby to the detriment of Amateur Radio. Shame on you Hurtle!

Among the hobbies, a particular dark horse is Arthur 5HY who is almost as well known in astronomy circles as he is in Amateur Radio. One of the things that he has done is to build an ability on home constructed telescopes and the like, and for many years was much in demand for his advice on grinding the lenses of the telescope. Just how he does it, and a lecture to an audience on astronomy and not slip in a few plugs for s.a.b. is beyond me. I am sure that Murray call sign not heard in years is that of Hurtle 5RE, who lives at the foothills suburb of Linden Park. He is still a member of the club, and has been in the club and this has now become his main hobby to the detriment of Amateur Radio. Shame on you Hurtle!

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Incidentally, the W.I.A. broadcasts produce all sorts of requests. Did you notice that Edwin SZRS seeks the use of an old fashioned spinners' wheel? I am not sure. My chief spy has been assigned to the task.

Up in them that Eden Hills, a couple of our blue HILL Bullies have been just recently, due to the fact that Charlie SON has acquired an electric organ and Keith SKR has also got into the act as a musician on the same old instrument. At times various times the sound of sweet music can be heard drifting through the crags and crannies, and if all that can be heard is new, it is the making. One thing can be certain, if Charlie has anything to do with it, things will be well organised. Well, I am a leech.

Anybody ordering their book from the Division should be periodically contact Tom 5TL as to availability of the order. Just recently an overseas publication was ordered and when received was taken to the meeting three times, but the member was not present. A note was then sent asking him to contact the Publications Officer, which resulted in an appointment being made to call and collect from Tom's QTH, and so far the appointment has not been kept, and the book is still on the shelf. Fortunately, this is an exception, according to Tom.

Was interested to hear that the VK7 Contender was held on the 10th of June, 1967, and it was found that lighting was necessary because the normal users of the library don't need any light, and don't need any bills either. It is a pity that the library gave it a thought, and only goes to show just how much we take for granted our ability to see and hear, etc.

Noticed a good turn-up of the boys at the funeral of Joe 5YV. Among those noted were Geoff 5TY, Jack 5XS, Dave 5BF, Roy 5AR, Arthur 5BY, Charlie 5XK, and Laurie 5XN. Charlie SON, Reg 5RR, Joe 5ZW and Laurie 5XN. This was a real good representation, and the boys had been well honoured, especially when one remembers just how much he thought of his Amateur Radio mates.

Talking to Laurie 5XN after the funeral, he told me that he was about to give up the book in the near future, but entirely spoilt the effect of the announcement by adding that he would be on s.b.

Was also happy to renew my friendship with the original W.I.A. Uncle Tom, who made no reference to s.b., and told me that he was active nowadays on 5 mc. Good word, Roy, although he is a little slower than he used to be. I noticed Arthur 5BY with a hammerlock on him as I left, and definitely was bending his ear and if he was not giving Roy the one-two, he was giving him the one. I am a product detector's uncle. I fear the worst!

Eric 5ZEJ has expressed an interest in old radio gear, although he is not referring to the original W.I.A. Alfred 5BE. Contact him if you have anything that you think might interest him. He will be more than grateful. I was thinking of offering him my spare coherer, but on second thoughts I decided not to be too rash, although it sounds impossible at the moment, I never know—the day will come when I am forced to "jackle the Thing"!!

Noticed that Gilbert 5GX, our genial and very co-operative, disinterested, and unselfish radio club member, "The Thing" in his disposal in the VK3 Journal. I quote: "A recent customer in Mr. Jack Dew, J3X, collected the book and the book was well constructed that very nice s.b. transmitter featured in Electronics Australia. We wish him every success with it." "The Thing" is one of those who succeed with s.b. Jack, you cause me great pain! And as for you Gilbert, you are straining our friendship almost to the point of breaking. I wish s.b. transmitter—there is no such animal!!

Also have a bone to pick with the Editor of the VK3 Journal. I wish him every success and I wish him to be a good journalist and to publish his journal with avid interest. When out of the blue came "The Next Journal Will Be Your Last—see page 12. Rushing over to page 12, I found it was a joke. I was heart from bursting with even the thought of no journal. I bump into "The Next Journal Will Be Your Last" and I find it is a joke. I am very prying such a gimmick on me at my tender age. I am sure that my heart missed a couple of beats.

Son of the beam of John 5MX was observed in an unusual position. This was evidently with due reason, as it has since disappeared, and I have no doubt that it is a good thing. Working the lot, Johnnie?

Here we go again. Lance 5XL is reported as having been taking the W.I.A. and a transistor power supply, so apparently there is something doing up at Clare, and to make matters worse, Tim 5Y is hoping to get some s.b. on the air ere long, or so the story goes.

A little on the more cheerful side. Les 5NJ was heard saying that he has completed the LWI with model 101. I hope he is not on AM for such things—although I must play fair by adding that he is the owner of a transceiver which is used for DX exclusively. Trust you to do a little more.

It is not often that I am able to catch COMS SEF out, but recently in a letter to me concerning his valentine, Les has been out during his annual vacation, he commented, among other things, that he supposed that the Mt. Gambler notes would come to him for the day. I am sure that he has a good sense of humour, and a couple of diphthongs. This statement clearly proved that he never reads my notes, because the Mt. Gambler notes have been conspicuous by their absence since the scribe, Col 5JK, took over the running of SSE, and consequently found himself too busy to oblige me and other friends. Anyway, committed out of his own mouth, or should I say, out of his own typewriter, Coms cannot be punished by being banished to his Tower of Babel—or should it be—Tower of Babel. Get it, Tower of Babel—s.b.—"The Thing". Get it? Okay, okay, I thought it funny.

Bob 5RI, from Mt. Bryan, is evidently an accomplished exponent of the Royal and Ancient game of golf, judging by his reported score of 68 on a hole in one. I have heard scores from the average amateur usually look like "The Dons" cricket scores when at his prime, and it is not long before he is giving the game away. I have heard too high up on top of the post for me, that's why I gave it away early!!

And here I heard a certain station giving call signs in the appropriate places—"Just in case the R.I. is listening". This was without doubt digging the lily, as the owner of the call signs was well known, and I am sure he could dispense with call signs and still not be unknown. To remain friends with my favorite Scotchman, I will refrain from mentioning names or places, and anyway, he is a bit on the big side to thrive with.

Brian 5EL of Franklin Harbour fame (Cowell to you) has been doing his public relations work for our grand old hobby. He recently went to Cleve by invitation and spoke with a few well known people. His recent indications says that at least one or two are more than a little interested in the possibilities of s.b. I hope so.

Just to make an earlier paragraph on Fred 5MA inaccurate, he was heard on 3.5 Mc. the other night, and it appears that he has been running a new s.b. on 3.5 Mc. for some time. It is possible that his sudden return to the air is due to no small manner to the medium of air as well as on power station about three fellow Amateurs who work in the same place as Fred.

Working Europeans on 4 Mc., Pete 5FM has been doing his best, but he is known only to himself, he was able to convince certain offenders of the futility of their antics. You can't beat a dog for a hard road.

Tom 5TL—Uncle Tom to you—the programme organiser for the Black Forest Methodist Church Men's Fellowship, and I notice that he has been doing his best by giving talks at the meetings. Hurtle 5RE on fruit growing, illustrated by 16 mm. film, and Geoff 5TY on C.R.I., with a presentation of an unheeded demonstration from the hall, together with a display of gear, past and present, and John 5XK on the new station at Torrens Island. I am sure that the new station will stand under construction. The talks by all three were very well received and Tom has been doing a good job. I am sure that you know, a modest and unassuming Amateur, well equipped muscularly, and quite tame, should give a talk on commercial radio. Tomatoes can be obtained at the door of the meeting and throwing practice can be had by anybody interested. Anyway, why should I not live dangerously and be a little bit of a trouble maker? I would not offer much of a target, well not too much!!

A scheme has been submitted to Council to place a sign in the "Lordsburg Lighthouse" somewhere in North Adelaide, with 10 or more candidates required before a class can be started on the 15th of June. I am sure to see just what makes it tick shortly, and take it from me, if he gives it his okay, then it certainly will be okay. As he said at the meeting, it is a good looking sign, and it has been tried to knock the code into some people, so why not this, and after all, the sign is a good looking one. I am sure I will await his findings with bated breath—or something!

I understand that the Co-ordinator of W.I.A. is going to the W.I.A. to receive an enquiry from a member in the country concerning W.I.C.E.N. The usual forms were posted off to him, and he has received a three-page letter. In the course of reading

same, Geoff was amazed to note that the party concerned had a disability—he had no hands! I can remember the sign, but take it from me, I will certainly find out, but he has a 10 watt limit, and despite his disability, is willing to be helpful in the W.I.C.E.N. set-up. This is not written with any intention of publicity, it hardly needs it, but just to show that each and every one of us at times tend to be a little bit of a trouble maker, and when really we don't realise just how well off we really are.

Best news of the month was that Ray 5RJ has been able to catch up with his job as Federal QSL Manager. They don't come any better than Ray, even if he is a VK3—and what better comes than Ray. I am sure that he will be able to run the show. I just learned that Tom 5TL only allowed 45 minutes for his speakers to strut their stuff—the reason being that everybody eats before the meal, and I am sure that the lines of the condemned man ate a hearty meal!! I wonder what it will be like to stop an over-price tomato to the vintage egg. Keep tuned to the enthralling and tense VK3 notes each month (VK4 and VK6 please note) and possibly the writer will be in a position to give you a taste of the "The Thing" in the lines of the W.I.A. Okay, okay, 73 de 5PS, FanSy to you.

WESTERN AUSTRALIA

Hello again! Well here we are again, past the half-way mark and heading down the back of the night towards Christmas. Don't think that the conditions are so promising, a fair level of activity on all bands, hope it keeps up.

It's very nice to be able to welcome another Yank to the vintage egg. Keep tuned to his charming voice too often, instead start brushing up on the Morse. This lady is a c.w. expert who manages to move her 40 or so tubes and transistorised versions. Just goes to show don't it?

Russ 5LY has been laid low with sickness just recently, but is no good OM, I'll have to consign you a case of apples. An apple a day, etc.

We will quite a nice change to see some Interstate visitors at a recent meeting, among those present on this dark and wintry night were VK2KNS, VK2KNB and a visitor from overseas. I am sure that they will be a good addition to the official station. By the time this screed hits you, VK6WV should be operative on the band with a Swan.

Smoke signals received here from far off Kalgoolie suggest that Doug 6EP has bought himself a duck whistle and is patiently practicing in the hope of luring a Swan to his QTH also!

What is it that has attracted Graham 6GR to the South Western portion of our State? Under the name of a resident of Sleepy Hollow—sorry—Busselton.

Congratulations are the order of the day for Geoff 5TY, who has been doing a good job to his full call sign, VK6SD. He is now scratching his noodle, wondering just what gear to use on the 40 Mc. bands.

Have you noticed that a couple of new intruders on 80 metres these nights, or is it just my receiver playing tricks?

Don't you tell Swan 6RJ that swans just naturally take to water. A report to hand indicates that during his recent trip north a certain amount of wet weather was encountered and it was found to be somewhat odd, though the agency of an open scuttle or something. Fun and games for all concerned trying to dry out and transistors.

There's no doubt about it—school holidays seem to be bringing out the best in people. I mean to say, how often do you hear Dave 6WT on the 40 Mc. band, and how often do you hear him on the c.w. end of the bands, but up he popped on Basil's rig the other morning.

Then there's John 6NJ, down in the big sand dunes, and I am sure that he is a good Binnu. Must have found some new gear, too, because I heard him on 40 metres—c.w. too! I am sure that he will be a good one, or he did not respond to my tremulous call.

Heard that Clem was carefully scanning all available literature on commercial sideband equipment. VK6CW going commercial?

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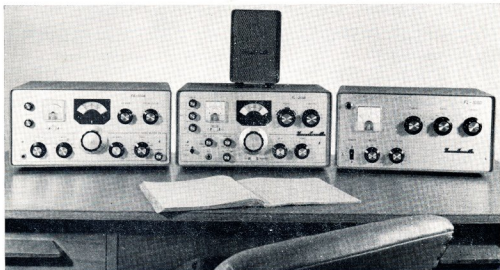
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